

(19) World Intellectual Property Organization
International Bureau



10/508986
Rec'd PTO 27 SEP 2004
PLEASE USE

AMENDED SHEET(S)

(43) International Publication Date
16 October 2003 (16.10.2003)

(10) International Publication Number
WO 03/085224 A1

PCT

(51) International Patent Classification⁷: E04H 3/02,
E04B 1/348, A47C 17/16, B60P 3/32, B63B 29/02, A47C
27/00, 27/04

(21) International Application Number: PCT/CH03/00225

(22) International Filing Date: 4 April 2003 (04.04.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PCT/CH02/00191 4 April 2002 (04.04.2002) CH

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant and

(72) Inventor: GUIGAN, Alain [CH/CH]; rte de Lausanne
167, CH-1096 Cully (CH).

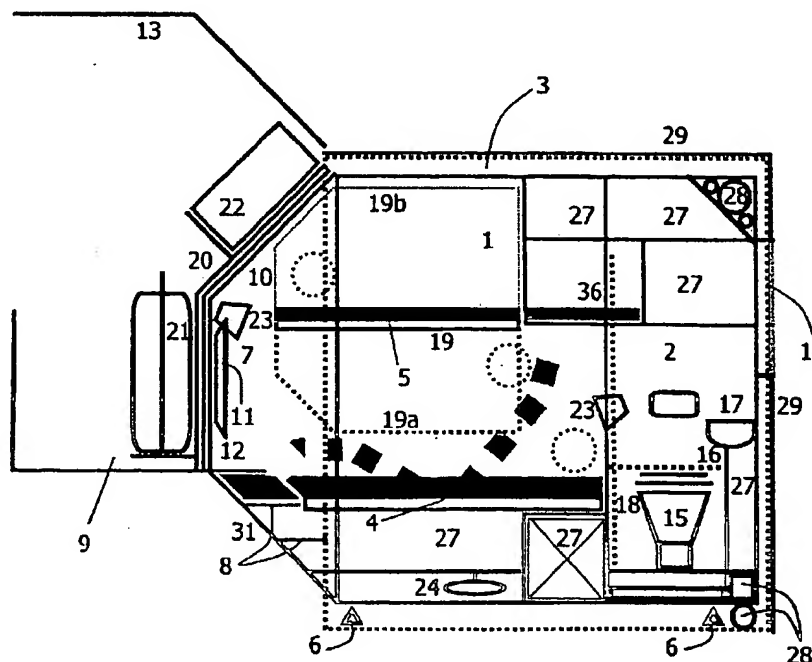
Published:

— with international search report

(74) Agent: ROLAND, André; Avenue Tissot 15, cp 1255,
CH-1001 Lausanne (CH).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MODULAR ACCOMODATION SYSTEM (BMAS)



(57) Abstract: The invention relates to a modular accommodation suitable for different purposes. The invention also relates to objects such as a bed and a cleaning device adapted for said modular accommodation.

BEST AVAILABLE COPY

Modular Accommodation System (BMAS)

DT04 Rec'd PCT/PTO 27 SEP 2004

The invention relates to Modular Accommodations.

5

One objective of the invention is to provide a Modular Accommodation Capsule (BC), which is a prefabricated, compact, sound insulated "private quarters" (i.e. bedroom and bathroom) where 2 to 4 persons can also relax, work, play, listen and view immersive" multimedia, etc.

10

BCs are preferably equipped with BMAS Beds (BBs), a specially designed bed, which can be fully converted to a chair, with all intermediate configurations suitable for relaxation.

- 15 BCs are usually manufactured in Modular Accommodation Modules (BM) formed by a number of BCs fitted in an ISO container frame.

Two BMs can be typically combined face-to-face (F2F), typically reaching a width of only 24' (7.3m), including the built-in central corridor.

20

The BCs of (and) a BM can be cleaned semi-automatically with the assistance of a Modular Accommodation "Servant" (BS).

- Another objective of the invention is, through the combination of BCs and/or BMs, on one or several levels, to allow the speedy and easy construction of very compact, economical yet attractive, collective housing facilities such as "Observer" Stand-alones, "Shelters", "Step combinations", "Motels", "Camps", "Hotels/Youth hostels", "River cruisers/Floating hotels", "Cruising catamarans", etc... when complemented with the usual "shared facilities" or simply "integrated in a building"

30

The invention therefore consists of a Modular Accommodation System (BMAS) as defined in the following claims.

Some examples and details of each component of the invention will be discussed hereafter with the help of figures.

Abbreviations

- 5
- BC = A Modular Accommodation Capsule
- BM = A Modular Accommodation Module, i.e. formed by a number of BCs fitted in an ISO container frame
- BB = A specially designed bed, which can be fully converted to a chair
- 10 BCT = A twin BC, i.e. with 2 beds and 2 extra berths
- BCS = A single BC, i.e. with 1 bed and 1 extra berth
- HC = Based on a "Hi-Cube" 40' container frame
- WPB = A BC Without a Private Bathroom
- F2F = A "Face-to-Face" combination of BCs/BMs
- 15 BS = A Modular Accommodation "Servant", i.e. a semi-automatic cleaning system for BCs and BMs

20

Figures	Figure N°
BMAS Modular Accommodation Capsules (BC)	1 to 20
Twin Accommodation Capsule Side section (with people)	1
Twin Accommodation Capsule/Module Side view	2
5 Twin Accommodation Capsule Side section (Toilet side)	3
Twin Accommodation Capsule Side section (Shower side)	4
10" twin Accommodation Capsule Top section	5
8' twin Accommodation Capsule Top section	6
6'8" single Accommodation Capsule Top section	7
10 5' single Accommodation Capsule Top section	8
8' twin Accommodation Capsule Front view	9
8' twin Accommodation Capsule Front section	10
8' twin Accommodation Capsule Back view	11
Twin Accommodation Capsule without private bathroom (WPB)	12
15 Side section (Left side)	
Twin Accommodation Capsule without private bathroom (WPB)	13
Top section	
"Compact" Accommodation Capsule WPB HiCube (HC)	14
<i>Side section</i>	
20 "Compact" 8' twin Accommodation Capsule WPB (HC) <i>Top section</i>	15
"Compact" 5' single Accommodation Capsule WPB (HC) <i>Top section</i>	16
BMAS Modular Accommodation Modules (BM)	17 to 20
25 20' Module, "Compact" 5' single Accommodation Capsules WPB (HC) + Bathroom <i>Top section</i>	17
40' Module, 8' Twin Accommodation Capsules <i>Back view</i>	18
40' Module, 8' Twin Accommodation Capsules <i>Front view</i>	19
40' Module, 9' Twin Accommodation Capsules & 4' "technical space" <i>Back view</i>	20
30	

	BMAS Bed (BB)	21 to 39
	Possible configurations (Bed height at ground level)	21
	Possible configurations (Bed height at usual level)	22
	Consecutive configurations (Bed height at ground level)	23
5	Consecutive configurations (Bed height at usual level)	24
	Consecutive configurations (Bed height at ground level)	25
	Alternative	
	Chair configuration	26
	Relax configuration "Hard"	27
10	Relax configuration "Hard-back"	28
	Relax configuration "Soft"	29
	Bed (or vertical) configuration	30
	Configuration change (Construction Principle)	31
	Bed configuration (Detail)	32
15	"Converter" in "Soft" position	33
	"Converter" in "Hard" position	34
	"Converter" in "Soft" position <i>Side view</i>	35
	"Converter" in "Hard" position <i>Side view</i>	36
	Consecutive "Converter" positions	37
20	"Converter" spacing	38
	"Developed" distance increase between "Soft" & "Hard" positions	39
	BMAS Modular Accommodation F2F (Face-to-face) combinations	40 to 47
25	F2F Combination of Twin Accommodation Capsule/module Side section	40
	F2F Combination of 8' twin Accommodation Capsule Top section	41
	F2F Combination of 8' twin 40' module Top section	42
	F2F Combination of 8' Twin Accommodation Capsules on 2	43
30	levels Side section (with people)	
	F2F Combination of 8' Twin Accommodation Capsules on 2	44
	levels <i>Side section</i>	

	F2F combination of 5' "Compact" single Accommod. Capsules in Staggered rows <i>Top section</i>	45
	F2F combination of 6'8" "Compact" Single Accommod. Capsules in staggered rows <i>Top section</i>	46
5	F2F combination of "Compact" Single Accommodation Capsules in staggered rows <i>side section</i>	47
	BMAS construction principles	48 to 52
	Twin Accommodation Capsule/module <i>Side view</i>	48
	8' twin Accommodation Capsule <i>Top view</i>	49
10	8' twin Accommodation Capsule <i>Back view</i>	50
	40' Module <i>Top view</i>	51
	40' Module <i>Back view</i>	52
	BMAS Modular Accommodation Servant (BS)	53
	Modular Accommodation Servant <i>Side view</i>	53
15	BMAS Applications	54 to 88
	"Observer" Stand-alone <i>side view (Deployed)</i>	54
	"Observer" Stand-alone <i>side view (On the move)</i>	55
	"Observer" Stand-alone <i>side section</i>	56
	"Shelter" <i>Top section</i>	57
20	"Shelter" <i>Side section</i>	58
	"Step Combination" <i>Side section</i>	59
	"Motel" <i>Front section</i>	60
	"Motel" <i>Top section</i>	61
	"Camp" <i>Front/Back view</i>	62
25	"Camp" <i>Side section</i>	63
	"Camp" <i>Top section</i>	64
	"Camp" <i>Top & Front view (ISO Container Module Assembly)</i>	65
	"Hotel / Youth hostel" <i>Front section</i>	66
	"Hotel / Youth hostel" <i>Side section</i>	67
30	"Hotel / Youth hostel" <i>Top section</i>	68

	"River cruiser / Floating hotel" 200' <i>Side view</i>	69
	"River cruiser / Floating hotel" 200' <i>Cross section</i>	70
	"Cruising catamaran" 80' <i>Side view</i>	71
	"Cruising catamaran" 80' <i>Front view</i>	72
5	"Cruising catamaran" 80' <i>Top section</i>	73
	"Cruising catamaran" 80' <i>Top section (Multipurpose room)</i>	74
	"Cruising catamaran" 80' <i>Cross section</i>	75
	"Cruising catamaran" 80' <i>Top & Side view (ISO Container Module Assembly)</i>	76
10	"Cruising catamaran" 240' <i>Side view</i>	77
	"Cruising catamaran" 240' <i>Front view</i>	78
	"Cruising catamaran" 240' <i>Top view</i>	79
	"Cruising catamaran" 240' <i>Vertical section V-V</i>	80
	"Cruising catamaran" 240' <i>Horizontal section H-H</i>	81
15	"Cruising catamaran" 240' <i>Cross section A-A</i>	82
	"Cruising catamaran" 240' <i>Cross section B-B</i>	83
	"Cruising catamaran" 240' <i>Cross section C-C</i>	84
	"Cruising catamaran" 240' <i>Side view (ISO Container Module Assembly)</i>	85
20	"Cruising catamaran" 240' <i>Top view (ISO Container Module Assembly)</i>	86
	"Integration in a Building" <i>Side section</i>	87
	"Integration in a building" <i>Top section</i>	88

The Accommodation Capsule (BC) & Module (BM)

5 The Accommodation Capsule (BC) is a prefabricated, compact, sound insulated "private quarters" (i.e. bedroom 1 and bathroom 2), accommodating 1 to 4 users, who can also use it to relax, work, play, listen and view "immersive" multimedia, etc.

10 BCs are either twins (BCT), equipped with 2 beds and 2 extra berths, accommodating 2 up to 4 users, or singles (BCS), equipped with a single bed and an extra berth, accommodating 1 up to 2 users, and any of these BCs can possibly be designed as a "compact" type and/or "without private bathroom" (WPB), to suit some specific applications.

15 BCs are usually built into Accommodation Modules (BM) of five 8' Twin, or four 10' Twin, or eight 5' Single, or seven 5'8" Single, or eight 6'8" Single BCs (or a combination thereof) fitted in a 40' ISO container frame, or of two 10' Twins or four 5' Singles or three 6'8" Singles (or a combination thereof) in a 20' container.

20 In practice, a BC is an integrated private quarters, small and cheap, but attractive for its users.

"Small and cheap" implicates that it should be produced industrially and delivered to the site in an easy, modular manner.

25

BCs are designed to fit in an ISO container.

The idea of converting ISO containers to living quarters is not new and has been successfully implemented by many manufacturers (such as Portakabin,
30 Containex, etc.).

However, the Modular Accommodation System (BMAS) approach brings it one step forward, by fitting a number of similar, prefabricated BCs side-by-side into an

ISO container, which allows the construction of more rational and therefore cheaper living quarters.

5 An ISO container has an 8' (2.43m) external width and 8'6" (2.60m) external height (or 9'6" (2.90m) for the "Hi-Cube" type), combined with standard lengths of 10', 20' and 40' (3.05, 6.10 and 12.2m respectively).

The natural choice was to design a BC to fit into a container of 8' x 8'6" x 10' or a multiple thereof, i.e. four 10' BCs per 40' container.

10

This gives a BC with the following internal dimensions (to take into account the thickness of the frame 3 and of the insulation material): Width = 2.88m, Depth = 2.26m and Height = 2.36m (or 2.66m for the "Hi-Cube").

15 Although a 10' twin BC model has been designed on the basis of the above dimensions, a smaller but still comfortable 8' Twin BC model, fitting five in a 40' ISO container, is the most standard BC, suitable for most applications.

20 It is to be noted that the BC's widths mentioned above may be adapted, in case some space needs to be provided for at the end of a BM to house some machinery or equipment.

25 For example, if one wants to keep 4' (1.22m) to fit a split A/C unit and/or other equipment at the end of a 40' ISO container, one could still fit four 9' (i.e. externally 2.74m, internally 2.57m) wide Twin BCs or six 6' (i.e. externally 1.83m, internally 1.66m) wide single BCs in the said 40' BM.

Such BCs would have dimensions and characteristics in between respectively the 8' and 10' twins and the 5' and 6'8" singles.

30

The Standard Twin Accommodation Capsule & Module (BCT) (Fig. 1 to 6, 9 to 11, 21, 23 & 51 to 55)

5 A Twin Accommodation Capsule is a BC with 2 adjustable beds 4 (and 2 additional berths 5) and a private bathroom 2, which should be adequate for most applications.

Based on the above,

10 A BCT 10' has the following internal dimensions: Width = 2.82m, Depth = 2.26 and Height = 2.36m.

A BCT 8' has the following internal dimensions: Width = 2.26m, Depth = 2.26 and Height = 2.36m.

15

All materials inside the BC will preferably be black, or dark and/or "warm" coloured, such as for example in natural coloured tainted wood, except possibly the mattresses (for example in a sharp colour), and the bathroom will preferably be white or in a light colour (and in wet-cleanable materials).

20

Each BC shall be linked to the container frame through silent blocks 6 or equivalents for proper sound- and vibration-insulation.

25 A BC may actually not be fully operational at time of shipment, specially in countries where the width of loads on roads is normally limited to below 10'.

Indeed, an angled front part 7 (which can be possibly shipped in the same container) may have to be erected on the site, which is a very simple and fast process since it does not contain any piping and very limited cabling.

30

This front part 7 is a very important feature of the BC design.

Indeed, it adds to the required depth to the BC, thereby providing for full-length adjustable beds (210cm) but also heightens the entrance to the BC.

5 This allows one to walk a few steps 8 down into the BC, giving the user the unusual but pleasant impression of walking down ("into a nest, a den"), reminding that of going from the cockpit into the cabin of a sailing boat.

This difference of level, associated with the angled design of that front part, allows also for a narrower corridor 9 between BCs.

10

Indeed, from about 4' (1.2m) wide up to the waste-level (i.e. about 3' (90cm) over the walking path, where the width is not so important), it becomes wider to reach about 8' (2.4m) at eye level, giving to the user the impression to the users of a wider corridor.

15

This allows for the typical face-to-face (F2F) combination of two 40' BMs to have a width of only about 24' (7.3m), including the corridor in-between.

20 One enters into the BC by sliding sideward the central angled frame 10 (possibly fitted with transparent glass) and walking down into the BC.

25 These and the two other angled frames 30 on each side of this entrance can be occulted from inside to obtain intimacy and or/darkness (for video watching) by using silver-coated or special darkening glass (actuated by light or electrically) or just simple curtains, or slide-down panels housed just under the ceiling of the BC.

A flat screen TV/monitor 11 can also slide in front of the entrance on rails, which are next and parallel to those of the BC's sliding entrance door.

30 In fact, one of the key attractions of the Modular Accommodation System (BMAS) concept is the possibility that the BC be filled with "state of the art" multimedia electronics at an attractive cost.

Indeed, in view of the limited dimensions and volume of a BC, a standard multimedia PC with out-of-the-shelf peripherals (or even a car system), preferably connected to surround loud speakers 23 and even a "bass shaker" 24, would provide enough "multimedia power" to allow the users to immerse themselves into TV programs, films, games, Internet and Intranet info, etc. made available to them through a Local Area Network (LAN) or Intranet.

The lower section 31 (i.e. approximately the lower third) of the angled front part is not transparent, for obvious reasons.

10

It can be either plain or, in case of multiple layers of BCs, it can be composed of the same frames as the upper parts, but fitted with mirrors, in order to increase the luminosity of the corridor(s) located in the lower level(s).

15 The two vertical sides 32 of the angled front part 12 are either plain or fitted with mirrors, on their portion visible from inside.

The corridor located 9 at an upper level, linking two BM in the typical F2F combination, is possibly covered with a transparent or translucent angled or rounded "roofing" 13.

20

This, together with the see-through path/corridor linking the BCs (made from metal or plastic grating or in a translucent material), should ensure some natural light in the corridor on the lower level(s) when several layers of BCs/BMs are combined together, preferably supplemented with some artificial lighting using possibly some hidden (natural or "warm" colour type) neon tubes.

25

It is to be noted there that although the use of a standard (not Hi-Cube) ISO container frame is suitable for most of the applications, the use of a "Hi-Cube" allows for the (upper part of the) corridor to be fully enclosed in the container frame.

30

After walking down the few steps from the corridor into a BCT 8', one walks into a passage 37, with a 210cm long (i.e. approx. 6'11" long) x 80cm (i.e. approx 2'7½") wide ("Queen Size") adjustable bed 4 on each side.

- 5 In a BCT 8', that passage 37 is approximately 66cm wide at bed level and 76cm at the level of 75cm wide extra berth.

- The extra width available in a BCT 10' allows its equipment with a dual "King Size" (i.e. 95cm or 3'2" wide) beds, thus leaving a very comfortable width of almost 1m
10 (at bed level) for the passage 37.

In the same manner, a BCT 9' could be equipped with 3' (90cm) wide beds while leaving (at bed level) another 94cm for the passage 37.

- 15 The said passage 37 leads to the "bathroom" 2, which is fitted with a large square, rounded or round window 14, to provide more natural light to the whole BC

A door 44 communicating with the outside, centred on said window, may be foreseen as an option for some applications.

20

The equipment of the bathroom is composed of toilets 15 on one side, a shower 25 on the centre and a full size ventilated cabinet 26 for clothes, accessible from the bathroom by a water-tight door.

- 25 This cabinet for clothes can also be accessible from the bedroom, by a door at the head of the adjustable bed located on the same side.

To make the bathroom more "cosy" when not in use, an articulated padded seat 16 covers the toilet bowl and extends all the width of the bathroom.

30

A wash basin/sink 17 is located in the middle, under the window and a duckboard 33 extends over the shower section of the bathroom.

A sliding door **18**, preferably fitted with plastic or glass, possibly frosted, of the type used for shower cabins, is installed between the bathroom and the rest of the BC.

- 5 That door or the window can be occulted by means of a curtain (or, for example, the window can be occulted by internal shutters covered possibly with articulated mirrors) to ensure the required privacy and/or darkness.

- 10 The two beds **4** located on each side of the passage **37** are preferably of the BB type, adjustable and possibly motorized.

One other important point of the design of the twin BC design is the fact that these two beds can be made into a double bed **34** by moving them sideward, through a system of slides, rollers, a dual position cam, etc.

15

Although this is obviously blocking the passage to the bathroom when the beds are joined, the occupant of one side can then slide/roll his bed back, leaving then enough passage for that person to squeeze out to the bathroom (or out of the BC) without disturbing the other occupant.

20

This system allows also for the storage of sheets, quilts and pillows in the space **35** made accessible behind the beds when they are pulled out (or under the beds when they are lifted).

- 25 The two extra beds/berths **5** (located at the upper level) are only 2m (i.e. approx. 6'7") long and narrow, from 75cm (i.e. approx. 2'5½") to possibly as low as 55cm (i.e. approx. 1'9½") at feet level **36** (in the BCT 8' version), which should not be a problem, since they will, most of the time, be used by children/teenagers.

- 30 The main (wide) part **19** of each of these upper berths is foldable up **19b** (to move it out of the way) or down **19a**, to act as the back part of a sofa, together with the lower bed acting as the seating part.

This means that the BC can then be used as a sitting room, with at least 2 people sitting comfortably on each side.

On each side a foldable table is fixed on the partition or the ceiling, and can be
5 stowed away. It is designed so that it may be used by the occupant of the lower bed, or by the person(s) using the opposite lower bed as a sofa.

Furthermore, various storage volumes 27 (open or closed) are available to store equipment of the accommodation capsule (such as the P/C, etc.) and the user's
10 personal belongings.

The Standard single Accommodation Capsule & Module (BCS) (Fig. 7 & 8)

A single Accommodation Capsule is a BC with 1 bed (and possibly 1 additional
15 berth) and a private bathroom, which will suit applications where individual occupancy is a must.

A 5' Single BC has the following internal dimensions: Depth = 2.26m, Width=1.34m and Height = 2.36m, i.e. allowing a passage 37 width of only 64cm
20 at (a 70cm wide) bed level and 69cm at (a 65cm wide) extra-berth level.

A 5'8" Single BC has the following internal dimensions: Depth = 2.26m, Width=1.57m and Height = 2.36m, i.e. allowing a passage 37 width of 77cm at (a
25 80cm wide) bed level and 82cm at (a 75cm wide) extra-berth level.

A 6'8" Single BC has the following internal dimensions: Depth = 2.26m, Width=1.85m and Height = 2.36m, i.e. allowing a passage 37 width of 90cm at (a
95cm wide) bed level and 1.05m at (a 80cm wide) extra-berth level.

30 In the same manner, a BCS 6' could be equipped with a 3' (90cm) wide bed while leaving (at bed level) another 76cm for the passage 37.

These BCs can be factory produced and dispatched in modules of eight 5' Single, seven 5'8", or six 6'8" Single BCs pre-fitted in a 40' container frame (or respectively four 5' and three 6'8" BCs in a 20' ISO container frame).

- 5 A simple foldable table **38** is fitted on the partition opposite the bed.

Generally, the description and functionalities of the single BC are very similar to those of a Twin BC, as described above.

- 10 **The "Compact" Accommodation Capsule & Module** (Fig. 14 to 16, 17 & 40 to 52)

In a "Compact" Accommodation Capsule, the bed or beds are lower **39**, when in a fully extended position, and occupy the space **40** under the central corridor.

15

This means that the bed or beds should be preferably of a BB type, fully adjustable to a seating position (with the "bed" and "relax" configurations at ground level **39**) and motorized

- 20 The space so freed can allow for the implantation of additional storage space, compared to the standard BCs.

Due to the specific design of the "Compact" BC, the table **38** is sliding under the floor of the corridor.

25

In the case of F2F combinations of the narrowest "Compact" Single BCs (such as the 5' "Compact" single capsule), the bed is narrower at the bottom, so that the beds of two consecutive BCs may be "in Staggered rows".

- 30 A module fitted with "Compact" BCs cannot be located over a module fitted in a standard (not "Hi-Cube") ISO container frame.

Generally, the description and functionalities of the "Compact" BC are very similar to those of a standard BC.

5 **The Accommodation Capsule "Without Private Bathroom" (WPB)** (Fig. 12 to 16 & 17)

Any standard or "Compact" BC can be designed and supplied without a private bathroom, for example due to limitations of the available depth.

10 In such cases, a special bathroom Capsule can possibly be included in the BM and shared by all the BCs of that BM.

The most simple example is that of a "Compact" BC WPB fitting fully into a "Hi-Cube" container frame, including the corridor, under which the bed extends.
15

The BMAS Bed (BB) (Fig. 21 to 39)

A BMAS Bed (BB) is a specially designed bed apparatus, which can be fully converted to a chair, with all intermediate configurations suitable for relaxation.
20

The BMAS Bed (BB) is a novel approach to the possibility of converting a bed to a chair (and the opposite), particularly useful in cases where the exiguity of a "bedroom" does not allow for both a bed and a chair, like in a BC.

25 Most attempts to solve this problem so far have failed to solve the problem of the "incompatibility" between a soft, flat, full length bed and a chair which needs to be firm, shaped (profiled) and "shorter" (Indeed, the full length of the mattress required for a bed cannot be used in a chair, which requires a shorter leg section).

30 Present Motorized adjustable beds, for example, have a limitation in the angle achievable by the head elevation mechanism, mainly due to the fact that, when folded, too much length of the mattress accumulates at the base of the splat of the

chair, (which by the way requires a blocking device at the bottom of the bed to prevent the mattress from slipping, unnecessary with the BB)

- 5 This makes it all the more uncomfortable that, due to the forward position of the articulation between the ilium and the femur, a man's "developed length" from neck to toe shorter when lying on his back then when he is sitting.

The BB concept solves all these problems.

- 10 A BB apparatus is a combination of several rigid articulated frames **64 65 66 67** (Fig. 21 to 24), the shape of which varies with its "deformation" to become a flat bed **58**, a relax couch/sofa **59** or a straight chair **60**, or even be set in a vertical position **61** (for example for storage).

- 15 These frames correspond to the "(leg) support", "seat", "back" and "headrest" sections of the apparatus.

- The bed height can either be fixed at a usual, standard level (of say 50cm) **62** (Fig. 18), i.e. in most cases and for example for a use in a standard BMAS capsule **4** (Fig. 3), or at a lower level, for example down to ground level **63** (Fig. 21) for the bed, which is required for example in the case of a BMAS "Compact" capsule **4** (Fig. 14).
- 20

- The relevant frames are fitted with specially designed "converters" **68** in lieu of the usual foundation slats.
- 25

The Converters (Fig. 33 to 39)

These "converters" 68 have basically two positions: "Hard" (Fig. 23 & 26) and "Soft" (Fig. 22 & 24), between which they can be rotated around a fixed pivot 78
5 fixed on the relevant frame.

In the "Hard" position (Fig. 23 & 26), the "converter" 68 is rotated so that the slat 50 bearing the mattress 51 is a rigid metal or composite profile, which height can be adjusted (Fig. 28) to give an adequate "profile" to the mattress 51.
10

In the "Soft" position (Fig. 22 & 24), the "converter" 68 is rotated so that the slat bearing the mattress is a flexible wood (or plastic, single or twin) slat 52, fully covered with a thick foam "cushion" 53 which "increases" the mattress 51 thickness accordingly.
15

The rotation between the "Hard" and "Soft" positions 56 is done by pulling a cable 77 fixed on each "converter" of a row (Fig. 27) or, for example, by pushing or pulling a rigid bar linking each "converter" in that row.

20 The rows of "converters" lining what are the "Seat" and "Back" sections in the chair configuration are mounted in "opposite" directions, so that the "developed" distance between these two parts 57 is increased when switching the "converters" 68 from "Soft" to "Hard" (Fig. 29).

25 (Fig. 26 to 30) Each of the four sections of the apparatus 64 65 66 67 has the "converters" 68 set in "Hard" or "Soft" position, depending on the actual configuration of the apparatus.

30 The converters 68 of the "(leg) Support" 64 and "Headrest" 67 sections are actually normally always in the "Soft" position (which means these 2 sections are possibly not equipped with "converters").

Those of the "Seat" 65 and "Back" 66 sections are in a "Hard" position when the apparatus is configured as a chair (Fig. 26) and in a "Soft" position when the apparatus is configured as a bed (Fig. 30) and can be either for the intermediate in-between Relax configurations (Fig. 27 to 29).

5

The last "converter" 69 of the "Seat" section, next to the "(leg) Support" section could also be set permanently in the "Soft" position (i.e. including in the chair configuration) to increase comfort at the thigh-calf articulation.

- 10 (Fig. 17) The distance 70 between "converters" 68 can be adjusted, to allow sufficient clearance between them, particularly when the height of the rigid profile is increased to give a "profile" to the mattress (in the chair/relax configuration) at a specific location such as under the thigh or the loin.

- 15 The "converters" may be designed to be "stable", i.e. they do not require any tension of the cable 77 neither to remain in the "hard" and "soft" position.

The number of and the distance between the "converters" can also be adjusted to fit the dimension of the (typical) user.

20

The contact surface between the converters and the mattress can be lined with a self-lubricating material to ease friction when the "converter" is switched between "Hard" and "Soft" positions.

- 25 Finally, the activation of the converters (in "waves") can achieve a relaxing massage effect.

The Configurations (Fig. 21 to 32)

The configuration of the BB apparatus itself is determined by the position of an articulated frame, the main part of which, the "chair" frame 71, is fixed to the back
5 part of the apparatus, and which stands vertically from the ground to the top of the headrest in the chair configuration.

If it is horizontal, the apparatus is a bed. If it is vertical, the apparatus is a chair. In
10 between, the apparatus is a relax armchair.

The smaller part of the articulated frame is linking the base of the "chair" frame to
the ("free") extremity of the "(leg) support" frame.

The armrests, if any, fixed to that frame 71 and the seat frame 64 (and so guided
15 to remain parallel to the seat section 65) are collapsible.

It is to be noted that the frame can be lifted higher to reach a vertical position 61,
useful for leaning or as a stow-away position, suitable for example for cleaning .

20 The top of that frame 71 can be designed in a way that it slides on a rail fixed vertically on the headboard and is fixed to a cable 73 running in that rail.

That "chair" frame 71 is allowed to incline itself, by pulling the cable 73 down, and
letting the bottom of the frame (and the smaller frame), fixed to a horizontal rail or
25 on casters 74, distance itself from the base of the vertical headboard, preferably with the assistance of for example a spring to give the necessary starting impulse.

(Fig. 23 & 24) The articulations between the other frames are guided by rails 72
so as to ensure an adequate angle between them and thereby the correct
30 positioning of the seat sections.

(Fig. 25) Another way, for example, of securing this positioning is through one
"leg" 78 equipped with a caster, which can be fixed on each side of the "seat"

frame, and another 80 at the articulation between the "seat" & "back" frames, in adequate positions, so as to keep the height of the "relax" and "bed" sections at the usual level.

- 5 The chair can be motorized, preferably using only one electric motor, pulling on the cable 73 fixed on the back frame, with the cables 75 rotating the "converters" being activated through a sprocket (which is itself rotated when passing by the notch of a rack positioned adequately on the back wall).
- 10 Furthermore, the bed can be motorized with the same kind of motorization used in standard electric beds to allow for an independent inclination of the back and headrest...

- (Fig. 32) The problem mentioned above, that the full length of the mattress
- 15 required for a bed cannot be used in a chair, which requires a shorter leg section, is solved by the fact that that "excessive" length of mattress 76 is fixed, on an independent foundation located at the bottom of the bed. In the Bed configuration, the "moving" section of the mattress connects to that fixed section to reach the full bed length. The shapes the mattress at the end of both section is angled in a way
 - 20 preventing the user's feet from going under the fixed section.

Other applications of the BMAS Bed

- It is to be noted that the applications of the BMAS Bed (BB) are not limited to the
- 25 BMAS Capsules, but can have a much more universal appeal, not only whenever the exiguity of a "bedroom" does not allow for both a bed and a chair, but also, for example when there is a requirement for a bed to be transformed in a chair, such as for disabled people, in hospitals or at home.
 - 30 In such cases, the chair can be mounted on wheels and freed from the cable fixed to the back frame to be able to use it as a normal wheel chair....

**The "Face-to-face" (F2F) Combination of Accommodation
Capsules/Modules (Fig. 40 to 47)**

- 5 Two BMs can be typically combined face-to-face (F2F), typically reaching a width of only 24' (7.3m), including the built-in central corridor (or lower in case of compact BCs and/or WPB)

Although the combination of BCs and BMs does not need to be face-to-face
10 (F2F), this combination offers most space saving, at least for the larger structures.

Indeed, the F2F combination makes the best use of the specific multi-level configuration of the BCs, and particularly of the feature, which allows for a multiple width corridor between the BCs.

15

As stated above, that difference of level, associated with the angled design of the front part, allows for a narrower corridor between BCs: From about 4' (1.2m) wide up to the waste-level (i.e. about 3' (90cm) over the walking path, where the width is not so important), it becomes wider to reach about 8' (2.4m) at eye level,
20 thereby giving the user the impression of using a wider corridor.

This, in turn, gives a novel and much more rational (and exploitable/interesting) organization of the available volume, as evidenced in the numerous examples of applications of the BMAS concept.

25

The Accommodation Capsule & Module "Servant" (BS) (Fig. 53)

The BCs of a BM and the BM themselves can be cleaned semi-automatically with the assistance of a semi-automatic cleaning system, or "Servant" (BS).

30

Each module will have a foldable trolley 20 running on a set of rails, which are next and parallel to those of the BC's sliding doors.

This trolley, which will be usable to carry luggage 21, catering and/or other goods (like a usual hotel room cleaning trolley), will be stored in a folded position at the end of each BM.

- 5 It is to be noted that a single BS may also be used to service both sides of a face-to-face combination.

This trolley 20 will also be used to carry the cleaning equipment 22, allowing an easy vacuum and wet cleaning of each BC.

10

That cleaning equipment and its carrying trolley, globally called the "Servant" (BS), will have one or more extendable (possibly "balanced") arms 90, which will be entered into the BC to vacuum clean it thoroughly, to wet clean the bathroom, the window and all other "wet cleanable" surfaces, and possibly to
15 sanitize/deodorize /perfume the bathroom.

The degree of sophistication of the BS will depend of course on the type and sophistication of each project as well as on the number of BCs to be cleaned at one location.

20

For, example if there are only a few BMs to be cleaned, the BS could consist solely of a trolley carrying a vacuum cleaner, a high-pressure cleaner and a tank sprayer, with an "arm" 90 regrouping all the flexible hoses, which would help the staff clean the BCs faster and more thoroughly.

25

In a larger structure like a multi-storey hotel, the "Servant" could be more sophisticated, allowing the cleaning to be more automated. It could for example be equipped with a robotized arm programmable to clean semi-automatically all the (or the pre-selected) BCs of a module in a row before being moved to the next

30 module or trolley, and so on.

However, in any case, the BS will need to be operated by one person, and the role of the BS would be more to increase the productivity of the staff than to replace it.

5 BMAS Applications

The combination of BCs and/or BMs, on one or several levels, allows the speedy and easy construction of very compact, economical yet attractive, collective housing facilities such as "Observer Stand-alones", "Shelters", "Step
10 combinations", "Motels", "Camps", "Hotels/Youth hostels", "River cruisers/Floating hotels", "Cruising catamarans", etc... when complemented with the usual "shared facilities" or simply "integrated in a building".

The fact that the private quarters are relatively small in size (and hopefully in cost)
15 will allow the investors in a project to spend more attention and money for the equipment of the BCs and "Shared facilities".

This exiguity and possible lack of individual storage space in the BCs is at least partially compensated by an additional lockable storage, which will allow the
20 guests to store, during their stay in the BC, the luggage, extra clothing and other personal belongings, which could possibly not fit in the BC.

This additional storage can be located in a less accessible part of the housing facility, possibly next to a laundry (coin or staff operated), when applying.
25

The combination of BMs does not need to be face-to-face (F2F). However, this combination offers most space-saving, at least for the larger structures.

We hereafter study some examples of the numerous applications of the BMAS
30 concept...

Note: To simplify the presentation, we are basing all the following examples on twin BCs. One will easily extrapolate in case Single BCs are wished.

BMAS "Observer Stand-alone" (Fig. 54 to 56)

5 In this example, we study the possibility of adapting a BMAS Capsule as a Stand-alone, to be used for example as a movable observing or guarding post.

Such a BC could also be installed in someone's (existing or specially built) home or garden (as an "appendice" to the house or self standing), where it could be used as a bedroom/studio for visiting friends. It could also be built in as an integral
10 part of a Mobile Home or attached to one.

Such a "temporary" building would probably not require a building permit, especially if it is mounted on wheels.

15 One could imagine for example a standard 8' twin BC 100 or an "extended" 8' twin (i.e. similar to the one presented under the Shelter application presented hereunder).

This BC would be tractable, thanks to removable wheels 102, and could be
20 installed properly on a non-flat spot, thanks to adjustable legs 103.

Access to the BC would be done from the back, which would be fitted with a door 44 (which would imply the moving of the sink out of the way) and a few steps.

25 The cover 105 and the balcony 106 could be foldable when the "Observer" s not in use.

Possibly, the height of the BC could be that of a HiCube container, to allow for the deployment and storage of some equipment, such as foldable solar and rainwater
30 collection panels 104, a satellite dish, etc.

Other equipment possibly required for the BC, such as an electricity generator, an A/C aggregate, etc. could possibly be carried on an accompanying trailer.

In such cases, BCs would need to be manufactured and supplied as independent units, not in modules (but still deliverable on flat bed trucks).

5 **BMAS "Shelter" (Fig. 57 & 58)**

With this example, we study the case of application of the BMAS concept to Shelters intended at protecting their users against potential external aggressions by human, animals, or chemical, biological or other possibly hostile agents, etc.

10

The idea is to use a 20' HiCube ISO container 107 to house an "extended" 8' twin BC, i.e. to which approximately 2' in depth have been added to allow for additional storage 108.

- 15 This leaves enough space for a "front room" 109 of 8' by 8' (2.4m x 2.4m), which can be used as a place for storage and preparation of tools/weapons, for working, meeting outsiders, analysis/decontamination, etc. and is accessible through doors 101 opening to the outside.

- 20 This system would further allow for two large storage and equipment holds.

The first one 110 is located (and accessible) under the floor of the above mentioned "front room", i.e. still within the 20' ISO container, and is therefore protected from outsiders or outside agents. It will therefore be used for all vital
25 storage and equipment.

The second one 111, located on top of the BC, is less protected since it is accessible only from outside and will therefore be used only for non-vital storage & equipment.

30

These Shelters can possibly be fitted with an additional cover 112 adjoining the "front room" and be connected to each other and share their "front rooms".

The BMAS concept can of course be used to build other types and sizes of shelters.

5 For example, an F2F combination, based on a "HiCube" ISO 40' container frame, with a steel back and face of the module, possibly equipped with smaller bullet-proof windows facing the outside, would make a BM based facility, equipped with "Twin" or "Single" BCs most suitable as barracks for the military, or as cells for inmates, or as a "bomb" shelter, particularly when buried underground.

10 **BMAS "Step Combination" (Fig. 59)**

Other BC combinations could also open other uses for other BM based facilities, such as the "Step" or Terrace type combination, whereby each BC uses the top (roof) of the one below as a terrace 113, as shown in the attached illustration.

15

Extra storage space 114 would be available under each BC.

This would allow for example to take advantage of the slope of a terrain to build a prefabricated holiday housing complex.

20

One could also consider building an artificial structure housing shared facilities with a ceiling made of BCs supported by beams with the required slope of 30°...

BMAS "Motels" (Fig. 60 & 61)

25

A BMAS Motel is one of the most basic collective housing facility, which can be installed and operational in a matter of a very few hours (on a leveled ground).

30 A most simple example uses an F2F combination 115 of 2 BMs i.e. a total of 8 or 10 twin BCs, housing up to 40 persons, coupled at one extremity with a 40' "technical module" 116, positioned (on legs/jacks) at a higher level than the ground and which can house a "reception" and/or shared kitchen, cafeteria,

storage, vending machines, as well as the A/C or ventilation system feeding a duct 120 over the corridor.

5 The access to (and from) the individual BCs can be done either, at ground level, through the (back) door 44 and the bathroom 2, or (if and when allowed by the management of the motel) through one extremity of the corridor, after going up a few steps from the ground level, or through the other extremity, after going down a few steps 117 from the raised floor of the "technical" module.

10 Access to that raised floor from the ground level can be done by (foldable) stairs located either 119 on one side of the "Technical module" 116 or inside that module, where other stairs can also lead to a "terrace" 121 i.e. on the top of the "technical module".

15 A canopy 118 runs on each side of the F2F combination, to provide a covered area for the loading and unloading of the clients' vehicle.

It is to be noted that the basic motel described above can be "repeated" a number of times to increase its capacity. A doubling of that capacity can, for example, by
20 adding an F2F combination at the end of the first one or on the other side of the "Technical container".

BMAS "Camp" (Fig. 62 to 65)

25 The BMAS Camp is actually a combination of BCs, on a single level, with four F2F BM combinations 115, representing a capacity of a total of 32 to 40 twin BCs, i.e. a maximum housing capacity of up to 160 persons.

30 In the example illustrated, these four F2f BM combinations 115 are connected on one side to two 40' container modules (one on top of the other) housing the "shared facilities", giving a construction spreading on only 88'x 52' (26.7m x 17m), i.e. 4'600 sqft (450 sqm).

The upper 40' container **116a**, connecting the 4 BM F2F combinations could house some of the shared facilities, such as a cafeteria, a kitchen, a reception, vending machines, etc., which are usually housed in other buildings, and its top could be used as terrace **121**.

5

A Canopy **122** extends on both sides of that container, housing a balcony **123** as well as some (emergency) stairs. And another canopy **127** extends at one or both free ends of the F2F Module combinations to cover vehicles of the guests of the camp.

- 10 The lower container **116b** or "Technical module" could house all the technical machinery & equipment necessary to provide to all the camp the required heating, hot & cold water supply, electricity, waste water treatment, LAN & satellite TV in-feed, etc. as well as the A/C or ventilation system feeding a duct **120** over the corridor. It could also house a laundry as well as internal stairs linking to the upper
- 15 container level.

- Technical passages **128**, running under the passages linking the BCs, at the same level as the lower container ("Technical module") **116b**, allows an easy access to the volumes **124** located under the BCs, which can be used as storage
- 20 (for water, fuel, waste water, etc.) as well as for foodstuff, extra personal storage for the camp users, technical equipment, etc.

- A working space **125**, which can be used for example as a "greenhouse", is created between two F2F combinations, by adding a glass cover.

25

As it can be expected that the camp will be set up on rough terrain, without foundations, it is foreseen that all the container modules will be set on adjustable jacks **126**, allowing for all modules to be set at a proper level.

- 30 The fact that the container modules are set at a higher level above the ground allows also a natural protection against running water and humidity as well as from pests, rodents, etc.

At the end of each BM F2F combination some steps can be foreseen to allow the residents to get in and out directly, at ground level (in case such a direct, non-centralized access is wished/allowed by the management of the camp).

- 5 It is to be noted that the angled roof (at least partially made of glass) installed over the BCs corridors could be avoided in case the BM modules are based on "Hi-Cube" containers.

BMAS "Hotel / Youth hostel" (Fig. 66 to 68)

10

Hotels (or Youth hostels) built with the BMAS should particularly be attractive to the business or student traveller who merely wants a bed to sleep, like in the "cheap" hotels of the known low-end chain.

- 15 However, the savings made with the industrial production of modules should allow the investor to compete with such very economic hotels by adding a few shared facilities such as a swimming pool and spa, a rooftop restaurant and bar and an open atrium filled with tropical plants 133.

- 20 We have, for example, designed a "prefabricated " hotel, 15m x 15m (i.e. about 50' by 50'), on 6 floors, of which the bottom one is composed of 6 "technical modules" 116 housing all the equipment and machinery of the hotel as well as used for the reception, the administration, laundry, etc. as well as a spa and a swimming pool 130.

25

The 4 middle floors would consist of three F2F 40' BM combinations 115, i.e. a total of 96 to 120 twin BCs.

- 30 This would give a capacity of 144 to 240 persons, depending on the types and combination of "rooms", based on an occupancy of 2 per twin (and double these capacities in case the extra berths are used).

Extra personal storage 135 for the guests is made available on each floor.

The top floor, accessible through lifts 134 is housing a panoramic bar and restaurant 131, with their relevant kitchen and bathrooms, as well as a terrace 121 on top and around it.

5

All kind of smaller or larger or smaller youth hostels or hotels could be designed in the same manner, the difference of category stemming not only from the types and equipment of the BCs (particularly their sound and video equipment), but also from the quantity and quality of shared facilities.

10

BMAS "Cruiser / Floating hotel" (Fig. 69 & 70)

The BMAS is particularly suitable to equip Cruise vessels, where available space is scarce, allowing one to use the saved space to make more "shared facilities" available to the cruising guests.

15

One will find hereafter more details on the very promising application to sea-going Catamaran cruisers.

20 The BMAS is also of course very suitable for the construction of mono-hull Cruisers of a minimum width of 24' (7.3m), i.e. based on the typical F2F BCs combination (so that the design is symmetric).

One could reasonably design a motor Cruiser in the 80' (24m) range, with one module length (i.e. 12m) F2F combination on one level (deck).

25

Since, probably, 8' Twins BCs are preferred for the crew, the total number of passengers would be 18 to 36, (depending on the occupancy), representing five 8' Twin BCs for the crew and for example four 10' Twin BCs for the skipper and for the guests.

30

More interesting is the application to Riverboats, which must be, by design, long and narrow.

A typical, traditional, 200'x 24' (i.e. 61m x 7.3m) River Cruiser, would normally have cabins for 50 passengers and 14 crew, i.e. 32 twin cabins.

- 5 Based on the BMAS, one could easily fit in the same space three times 2 levels of F2F BM combinations, i.e. for example, ten 8' Twin and forty 10' Twin BCs in total, housing a total of 100 passengers, i.e. 20 crew and 80 guests (based on double occupancy), i.e. double the capacity of a traditional River Cruiser of the same size!

10

It is indeed further expected that the crew to guest ratio of 1 to 3 in traditional cruiser could be reduced to a 1 to 4 ratio due to the easier cabin cleaning with the BMAS "Servants" (BSs).

- 15 Furthermore, there would still be ample space in front of, between, over and under the F2F modules 115 to house very comfortable shared facilities 140.

- This would also make a BMAS River Cruiser very suitable as a "Floating Hotel", particularly well adapted to provide temporary accommodations on inland
20 waterways, for example for trade fairs (as is the case already in cities on the Rhine such as Köln), emergencies, etc.

- The BMAS concept can naturally be applied to larger Riverboats, such as those touring the Danube river, which have a LOA in the 350 to 400' range (100 to
25 120m) and a beam of 50 to 75' (15 to 23m), which typically accommodate a crew of 75 caring for 200 guests.

- The same internal volume could accommodate again, based on the BMAS concept, at least 600 passengers, i.e. 120 crew and 480 guests, in sixty 8' twin
30 and two hundred forty 10' twin BCs, based on double occupancy, and even more generous shared facilities.

The BMAS concept is of course suitable as private (sleeping) quarters for the largest vessels...

BMAS "Cruising catamaran" (Fig. 71 to 86)

5 The BMAS "Cruising Catamaran" is a project aimed at making cruising cheaper, thereby bringing to the cruising industry a whole new layer of customers, specially the less affluent, younger generation and their kids, who would like to go on a cruise for holidays but could not afford it so far.

10 Indeed, one of the great advantages of the compact private quarters offered by the BMAS concept can be realized when designing a cruise ship.

Where, more than on a ship, is space scarce and expensive?

15 Thanks to the BMAS concept, small private quarters allow also the combination of several private quarters in a limited volume, hence the possibility of lodging a large number of people in a small volume.

20 When typical standard (twin) cabins in existing sailing cruisers range between 90sqft (8.4sqm) up to 195sqft (18sqm) (for Club Med 2, for example), an 8' twin BC offers full comfort for up to 4 passengers in a $8 \times 10' = 80\text{sqft}$ (7.4sqm) area, i.e. less than half the average standard cabin size found in typical sail cruisers.

25 Alternatively, when cabin space is a must, a 10' Twin BC offers even more comfort for up to 4 passengers in a $10 \times 10' = 100\text{sqft}$ (9.3sqm) area, i.e. still about half the average standard cabin size found in typical sail cruisers.

30 Actually, the intermediate 9' twin BC would be the recommended size for the larger BMAS cruising catamaran, since it allows for a 4' space at the end of each BM, which could house all the machinery and equipment, such as the A/C, relating to the whole BM.

The relatively small cabin size should definitely not be seen as a handicap by cruise customers, whatever their age, specially in view of the marine environment and the fact that they will stay only a few days or weeks on board and spend less of their non-sleeping time outside their cabins than inside.

5

Furthermore, there are several key advantages for the user of a BC over standard cabins: The sound and vibration insulation (specially when motor cruising) and the fact that all the berths are oriented sideward (which makes the sleeping passenger much less disturbed by the boat's roll, specially when occupying a double bed).

10

The relative exiguity of these cabins, however compensated by extensive "shared facilities", means the BMAS cruising catamaran is particularly well adapted for Mini-Cruises, Live aboard fishing/Diving trips, Adventure cruises, Floating classrooms, etc. and shall attract a younger and/or more sporty/active class of customers than the older and/or more sedate/passive clients of today's cruising ships.

15

It is to be noted also that, in the larger catamarans, two "BMAS Modules" are usually separated lengthwise by a space 150 of approx 8' (2.4m) not only to allow for the eventual positioning of lifts 134, a side entrance or only a view point with balcony, but also for safety reasons, such as the implantation of fireproof doors and stairs and boat emergency exits.

20

The front tip of each hull, which is fitted with the usual crushable and floating volumes, and the front half 154 can be used as an additional lockable storage and cloakroom for each BC, while the aft half 155 of the lower level of each hull would usually be dedicated to the ship machinery, equipment, tanks, etc.... as well as crew facilities.

25

30

The "shared area per guest" ratio is rather high with the BMAS cruising catamarans, where a 10 to 15sqm per guest ratio is obtained.

This allows for some very complete "shared facilities", as outlined hereafter, more than compensating for the relative exiguity of the BCs (cabins).

5 The type and size of a BMAS cruising catamaran depends essentially on the required passenger capacity and width (beam) of each hull.

The BMAS system is indeed particularly suitable to design cruise catamarans, thanks to the limited width of the BCs (and, particularly for the larger catamarans, of their face-to-face (F2F) combinations).

10

One will find hereafter short studies of power and/or sail driven catamarans, ranging from 80' to 240' in length, fitted with 2 to 52 BMs, i.e. suitable for 20 to 440 passengers (i.e. crew + guests), based on an occupancy of 2 per twin BC and double these numbers in case the extra berths are used.

15

It is to be noted that, when a BM is a mixture of 8' & 9' or 10' twin BCs, the 8' twin cabins, which would usually be affected only to the crew, could be separated from the 9' or 10' twin guest cabins by a (fireproof) partition equipped with a door, which could also be fitted between the modules.

20

We have focused on 4 sizes of catamarans so far, but other dimensions and capacities are of course possible (Note: Stated capacities are based on "twin" BCs with dual occupancy. These capacities can be doubled if the 2 extra berths located in each BC are used):

25

- A 80' BMAS Cruising catamaran (Fig. 71 to 76) holding 2 40' BMs, which we recommend to be equipped solely with 8' twin BCs. This would make it an ideal proposal for a crew of 4 or 6, taking care (respectively) of 16 or 14 guests, for charter, floating classroom, live-aboard, etc.

30

- A 140' BMAS cruising catamaran holding 8 40' BMs, making it an adequate proposal for a crew of 20 (housed in 8' twin BCs), taking care of 48 paying passengers (housed in more spacious 10' twin BCs), for example for a mini-cruise, a live-aboard for scuba diving, fishing, etc.

5

- A 180' BMAS cruising catamaran holding 16 40' BMs, making it an adequate proposal for a crew of 40 (housed in 8' twin BCs), taking care of 96 paying passengers (housed in more spacious 9' or 10' twin BCs, for example for an Adventure cruise, etc.

10

- A 240' BMAS cruising catamaran (Fig. 77 to 86) holding 52 40' BMs, making it suitable for a crew of 120 (housed in 8' twin BCs) taking care of 320 paying passengers (housed for example in more spacious 9' twin BCs), for a cruise, or as a floating university, a Floating resort, etc.

15

Some of the special features offered by the BMAS concept (some of which depend on the size of the BMAS cruising catamaran) are as follows:

- Un-sinkability

20

The space between the skin of the BM containers and the BCs would be filled with adequate (closed cell) foam, possibly pre-formed or injected in-situ ensuring not only the proper sound insulation of the BCs but also the floatability/un-sinkability of the whole Cruising Catamaran

25

- Education & indoor Entertainment

The larger Cruising Catamarans can offer, in addition to the extra storage facilities for the guests, a Shop with Vending/Ice machines, Several (2 or 3) Dining/Meeting/Living areas indoor plus Outdoor "café" and barbecue, a Bar/Piano/Discotheque, passenger lounges, Intranet/Cable and Home Cinema/Entertainment, Infirmary, etc.

Each cabin will be equipped with one PC (possibly multi-user/thin client), connected to a LAN, allowing access to the internet (whenever a reasonably priced connection is available) and to the ship's intranet, hosted in a powerful server located in the Skipper's office.

An additional LAN connection in each cabin will allow the passengers to connect their own PC/portable or to connect another PC in each cabin (for youngsters on a long stay).

This will allow the passengers to follow up the ship's journey, the weather charts, etc., take at will some interactive courses in sailing, diving, fishing, meteorology, computing, etc., view some documentaries on the next port of call, on wildlife (whale) observation, similar sailing experiences, etc..., prepare a website based on their current trip, or simply send and receive email, chat, view satellite TV, a DVD, listen to a CD, etc... and (for youngsters on a long stay) take their usual courses.

The ship will also be equipped with Webcams located at various "strategic" points, outside and inside, not only to allow and learn navigation "by instruments" from any PC of the LAN, but also, combined with handheld video cameras, to allow professionals or the passengers themselves to edit a video of their stay.

- Large multipurpose room (80' catamaran only) (Fig. 74)

This room 151, of approx 45 sqm at floor level but 70 sqm at elbow/eye level, where it counts (Thanks to the BMAS concept), is the "compensation" for the relative exiguity of the BCs.

The central point of the vessel, it be used as a room as a classroom for 24 students 151a, dining for 36 guests 151b, living, fitness & dancing 151c, show with stage for 36 persons 151d, (home) cinema or conference for 36 persons 151e, table tennis 151e, games and other sport, cultural, entertainment and social

activities and performances, as shown on the attached sketch, thanks to tables (which can be stowed away on sliding rails) and stackable chairs.

- "Technical module" (80' catamaran only) (Fig. 73)

5

All the ship's machinery is housed in one 40' ISO container frame **152** ("technical module") linking the two BMs, and therefore ensuring a stiff connection between the two hulls.

- 10 This module will include the two Diesel generators, the hydraulic power system, the air compressor (for diving bottles), the water makers, the Central A/C, the kitchen cookers, oven and washing machines, an ice-maker, the machinery for the Jacuzzi **158** situated on top and all the other machinery and instrumentation required to operate the ship.

15

The technical module will also house the "Skipper's office" **157**, which will include the navigation instruments, the computer server and network and the central electrical control panel.

- 20 It represents also an extension of the Skipper's BC, to which it connects through a private passage, thereby constituting a "suite" of approx 20 sqm.

- Technical modules (Larger catamarans)

- 25 All the ship's machinery is housed in 40' ISO container frames **152** linking the BMs, and therefore ensuring a stiff connection between the two hulls.

These frames can be either standard or the higher hi-cube types, depending on the ceiling height required for the corresponding decks.

30

These technical modules will include the Diesel motors and generators, the hydraulic power system, the air compressor (for diving bottles), the water makers, the Central A/C, the kitchen cookers, oven and washing machines, the ice-

maker(s), the machinery for the Jacuzzi(s) and the eventual pool and, more generally, all the other machinery and instrumentation required to operate the ship.

- 5 • Outdoor Activities, which can be offered on board (Fig. 79)

Note: Most of the following, applies to the 240' Cruising catamaran (Fig. 71 to 116) only. It is given as an example of amount of "shared facilities" which can be foreseen to compensate for the relative exiguity of the BCs, while taking
10 advantage of the space made available due to the said exiguity.

- Cruising & Relaxing:

This is naturally the first outdoor activity offered on a BMAS cruising catamaran:
15

- Be it sail-cruising if the vessel is equipped with a "MultiRig", an asymmetric rigging of 3 freestanding, semi balanced "Balestron" type rigs 161a, b, c, offering plenty of sail power which will make the guests forget that they are on a large cruise vessel, or,
20
- Be it motor-cruising at high speed, if the vessel is equipped with a hydrofoil system...

- Flying:

25

This is a totally new activity, unseen until now on any cruise vessel!

The passengers of a BMAS 240' cruising catamaran can enjoy/learn flying and aerial exploration, thanks to its design as THE FIRST CIVILIAN ULTRA-LIGHT
30 AIRCRAFT CARRIER, with a 200'/60m long runway 162, allowing the landing and take-off of gyroplanes and other VSTOL ultra-light aircrafts (and non-VSTOL ultra-lights, if a simplified catapult and arresting cable system are installed).

The median runway, covered with a heavy-duty artificial tennis-court type surface on most of its length (i.e.154'/47m), is constituted for the balance by a 1'4"/40cm deep sand pit **163**.

- 5 This pit is intended to slow down and hopefully stop any aircraft landing too long, which would then anyway be prevented from falling at the end of the runway by an inclined safety net **164**.

10 This pit can be protected with a canvas cover when needed, i.e. for example when the weather gets too bad.

Normally, the runway can be used at any time when no other activities are performed on the upper deck, even when the Cruising Catamaran is cruising.

- 15 However, it is to be noted that, in case of a "MultiRig" fitted Cruising Catamaran, the runway may be partially obstructed by the sails of the Balestron rigs **161** at certain points of sail, in which case the obstructing sail(s) can temporarily be redirected or furled.

- 20 This flying capacity can be supplemented with seaplanes, which can be hoisted to and from the Water-sports deck and stored into the Garage and Workshop **165** and/or with a helicopter, which can land and take off from a landing pad **166**, which so positioned as to be usable whatever the direction of the wind and position of the Balestron rig booms.

25 These seaplanes and/or the helicopter can be used to ferry passengers to and from shore locations and as rescue crafts to recover ultra-lights aircrafts experiencing difficulties.

- 30 When not in use, the Ultra-light aircrafts can be lowered to the Water-sports deck with the lift **167** located on the aft starboard side of the vessel and then stored in the Garage & Workshop.

That same lift will be used to lift seaplanes from the water level.

A "control tower", located under the helipad 166 on the portside at the stern of the Cruising Catamaran, allows the proper surveillance of the vessel and of the activities on the runway.

- Ferrying passengers & Shore exploration:

In addition to the above-mentioned aerial ferrying capacity, the BMAS Cruising Catamaran 240' is equipped with two unsinkable/self bailing tenders 168, up to 40'/12m long, each capable of ferrying at high speed at least 50 seating passengers.

The purpose of such large tenders is not only to be able to bring to/from shore or diving/fishing grounds a large number of passengers safely and swiftly but also, by lifting up or down these tenders in a special pipe "frame" 169 at the front, to allow for their easy boarding directly from retractable steps from the boat's deck, to use as additional/standby power plants for moves in port and/or electricity generation, and as an additional floating central hull if/when required.

Regarding shore exploration, the vessel will hold in its garage a number of bicycles, and possibly some scooters, to enable touring of shore locations.

Furthermore, the same garage 165 will hold a couple of four-wheel drive vehicles, which can be landed, with the help of the lift located on the aft starboard side of the vessel, either directly to the shore when the Cruising Catamaran is alongside a quay, or otherwise via a specially designed landing craft.

- Fishing:

The BMAS Cruising Catamaran 240' has been designed to satisfy the most demanding fisherman, as well as the beginner.

One retractable fishing platform 169 on each side, each fitted with 3 seats, allows for game fishing while the boat is cruising, while fish spotting can be performed from the look-out mast 170 located on the right hull or the look-out post 171 located on the main mast.

5

Game fishing can also performed from the large tenders located at the front, which can in such a case be equipped with a flying bridge.

In addition to the above, the Cruising Catamaran can be equipped with a trawl net spread between the hulls.

10

- Scuba Diving & Snorkeling:

Divers, beginners or experienced, are not forgotten.

15

The Cruising Catamaran will be equipped with all the equipment needed to practice their sport and one or more instructors will be available.

- Sailing, Canoeing & Kayaking:

20

Windsurfs, sail dinghies and catamarans, kayaks and canoes will be stored in the water-sports deck and adjoining Garage & Workshop, and made available for beginners and experienced sailors, under supervision of a sailing instructor using the smaller tender berthed at the aft, by a frame fixed on the taillift/liftgate 172.

25

- Motor-boating, Jet-Skiing, Water-skiing, Scurfing, Wake-boarding, Knee-boarding, inflatable-riding:

All these activities will also be available for the guests of the Cruising Catamaran...

30

- *Swimming:*

On the Cruising Catamaran 240', one can swim in the small fresh water swimming pool 173 located outside, on the starboard side but also, of course, directly in the
5 sea.

Indeed, the Cruising Catamaran is equipped with a large, shark-free, enclosed swimming area 174 , located in-between the hulls (which also provide a relative protection from outside waves).
10

This "pool" 174, covering an area of approx 130'/40m by 65'/20m, can be folded and stored under the ceiling of the tunnel between the hulls when the vessel is cruising.

15 Otherwise, it is lowered to water depths ranging from 4'/1.2m up to 10'/3m, depending on the required use of the relevant sections of the pool, such as swimming classes for kids or grown-ups, water polo, diving courses, kayaking or canoeing discovery lessons, etc.

20 Further advantages of this "pool" 174 are to allow people to swim in a shark-free enclosure and to allow safe/supervised swimming in the dark, thanks to projectors located in the hulls.

Finally, it may be used as a floating anchor in rough weather.

25

The foldable side platforms of the pool 174 will be equipped with stairs to go in and out of the water as well as with fresh water showers as well as a booth for the swimming instructor(s).
30

- *Tennis:*

A full-size Tennis-court **175** is available on the central area of the top deck.

- 5 Thanks to projectors fixed on a pole at each corner, it will also be available at dark/night, especially when the runway will not be in operation. It uses the same area as the basketball court and therefore both sports cannot be played simultaneously.
- 10 It is, of course, also not usable when the plane runway is in operation, in which case the tennis net and the a/m net curtain are removed.

The 10'3m high fence and net curtain surrounding the tennis (and basketball) court will be fine enough to keep most balls on the court during play.

15

- *Beach-Volley:*

- The Cruising Catamaran is equipped with a full-size beach-volley court **176**, with a 1'1/3 /40cm deep sand surface, as required by the rules of the relevant
- 20 international federation.

Thanks to projectors fixed on a pole at each corner, it will also be available at dark/night, especially when the runway will not be in operation.

- 25 It is, of course, not usable when the plane runway is in operation, in which case the Volleyball net and poles and the a/m net curtain are removed.

- *Track athletics:*

- 30 The sand pit **163** of the Beach-volley court can also be used as the landing area for long and high jumps, and even for triple jump.

- *Golf practice:*

A couple (or more) Golf-practice nets **177** can be located on the upper deck, so as to be usable at any time by the "golf addicts" will not want to miss such an
5 occasion to practice their swing.

- *Basketball:*

A full-size (AAU) Basketball court **178** is available on the central area of the top
10 deck.

Thanks to projectors fitted on a pole at each corner, it will also be available at dark/night, especially when the runway will not be in operation.

15 It uses the same area as the tennis court and therefore both sports cannot be played simultaneously. A 10'/3m high fence is running on each side of the court to prevent the ball from falling on the lower decks.

When the plane runway is in operation, the adjustable goals fixed to slides built-in
20 the deck must be moved to the side, as well as the 10'/3m high net curtain hanged on the projector poles, behind the back-lines.

- *Rock Climbing (artificial wall):*

25 The stern of the BMAS Cruising Catamaran is fitted as an artificial climbing wall **179**.

- *Bunggy jumping:*

30 Possibly available from the lookout post **180** hoistable on the main mast

- *Sunbathing:*

Sunbathing may be performed on many locations on the BMAS Cruising Catamaran 240'.

5

For example, one can rest on the front net between the hulls 181, where one will feel a refreshing breeze (specially when the Cruising Catamaran is cruising), while enjoying a refreshment around the swimming pool, or even on the onboard sand beach, i.e. the sand of the beach-volley court 163...

10

- *Jacuzzi:*

At least 2 Jacuzzis 182 will be available for the guests, for example next to the swimming pool.

15

- *Fitness, Aerobics, Gymnastics, Dance, Martial arts:*

These various group activities can be practiced outdoors (or in the fitness, gym & indoor sports room in case of foul weather or if all outdoor areas are occupied by other activities).

20

One or two instructors will be available for these group or private training lessons.

- *Other sports...*

25

... such as Badminton, Table tennis, Hot-air ballooning, Archery, Paintball, Roller-skating, Weightlifting, Bowl-games/ "Pétanque", etc. can also be playable on board of the BMAS Cruising Catamaran 240'.

30

- *Other outdoor activities...*

... such as Socializing, Dancing, Barbecuing, Drinking- or Eating-out, etc. will also be available on board of the BMAS Cruising Catamaran 240'

BMAS "Integration in a Building (Fig. 87 & 88)

One could think of designing a new construction, which would integrate some BCs as part of a new house, with openings to the walls **183** calculated to fit the BCs. .

5

In such cases, the BC would probably not need to be equipped with a separate WC and bathroom, i.e. could be a BC WPB, and the entrance to the BC could be done through a back door **184**, which could be integrated in a wall-to-wall cabinet **185** so as not to affect adversely the decoration of the house.

10

Furthermore, the BC's angled front part would protrude outside the façade of the building, possibly linking to a balcony or a terrace.

Other BMAS applications

15

As shown by the examples presented above, the BMAS concept can be used whenever there is a need for an economical, prefabricated (and possibly fast-implemented) collective housing facility, i.e. not only to build economical camps, ships or hotels, but also students housing projects, holiday bungalows, etc...

20

Furthermore, applications of the BC concept could be expanded in the field of land (road & rail) and even aerial transportation, i.e. where the size and weight of the capsule are paramount, and where passengers do not stay usually for more than one night.

25

For such cases, the design of the BC (i.e. without bathroom) can be adapted to fit into a single container width, including the corridor, by using a "hi-cube" container frame (i.e. 9'6 high instead of the usual 8'6) and by allowing for the bed to extend under that corridor.

30

And of course, the BMAS concept can be used for other purposes than collective housing: For example, another field of application would be the use of BCs as simulators or stimulators, for various tuition or demonstration purposes, in which

case they would be loaded with state of the art electronics and could even be articulated on a motion platform...

All this to say that the possible applications of the Baldakin concept are very wide
5 and probably largely unforeseen at this stage...

...One's imagination is the limit!

Modular Accommodation System (BMAS): Construction principles

10 BCs & BMs can be industrially produced in a factory, which can be located virtually anywhere, as long as it has road or rail access (i.e. ISO container handling capacity).

Accommodation Capsules (BC) (Fig. 48 to 52)

15

The BCs can be factory produced and dispatched in BM modules of four 10' Twin, or five 8' Twin, or eight 5' Single, or seven 5'8", or six 6'8" Single BCs (or a combination thereof) pre-fitted in a 40' container frame (or two 10' Twin, or four 5' Single, or six 6'8" Single BCs (or a combination thereof) in a 20' frame).

20

Each of these BCs is basically a box, constituted, for example, by two interlocking "shells" 41 43 and a front part 7.

25

The lower (bottom) shell 41, typically made of self-extinguishing (clear or white tainted) polyester resin with reinforced fibreglass (GRP), possibly using the injection process, would constitute the floor of the living quarters up to the bed's height and the floor and partitions of the bathroom up to the ceiling's height.

30

The inclined shape given to the outer walls 42 of that shell will allow for its easy removal from its mould.

The upper (top) shell 43 would interlock with the lower one and form the upper part of the box, i.e. the external partitions and the ceiling of the living quarters.

This upper shell, the internal partitions, the bottom and (possibly the) side panels of the front part as well as all the cabinetry would be made of (black or dark coloured) marine plywood and/or and lightweight PVC boards, such as
5 Komacel/Forex, or composite panels, such as MarineCell /BalsaMarine.

The other panels of the front part 7 would be constituted of preferably soundproofed glass framed by a specially designed aluminium frame with built-in sliding rails.

10

The Accommodation Capsules would also be fitted with silent blocks and externally with flexible foam, such as Airex/Stopflam/Tansonic, and/or pre-formed rigid foam, for sound/vibration and thermal insulation).

15 **Accommodation Modules (BM) (Fig. 48 to 52)**

The BM container modules can also be produced in an industrial manner, pre-furnished, with pipes and cables 28 pre-installed.

20 Preferably, the container's outside external "skin" 29, pre-fitted with thermal insulation and the windows 14, is fastened to or welded onto (usually the back, top and small ends of) the container frame 3.

The ISO container frames 3 and the skin 29 can be made of steel or (possibly
25 thick-plate) aluminium alloys, depending on the importance of the weight factor, as well as the required resistance to/and the corrosion exposure.

Each Accommodation Module (BM) has single inlet/outlet points for electricity, telecom/network (LAN/ Internet & Intranet), cable TV, hot and cold water, fire-
30 fighting circuits and fluids, heating and cooling fluids or A/C inlet (if/when applying), as well as the required ventilation outlet and wastewater outlet, so that the various modules can be assembled and connected together without much connection work.

Possibly, the BCs could be delivered un-complete, particularly regarding the electronic equipment, and could be finished at a local assembly point or on the erection site, where the Accommodation Modules could then be completed and
5 fastened or welded together to become part of a chosen BMAS application.

Other components such as the ISO container modules housing the "shared facilities" could also be pre-fitted in containers, or "technical modules", thereby allowing the saving of considerable amounts of time and money compared to the
10 traditional construction.

It is to be noted that most combinations of BCs can be based on entire BMs of twin or single BCs, fitted in a 40' ISO container frame.

15 This should allow not only savings on manufacturing and stocks, but also a better design and manufacturing quality control on a single product with few variations.

However, the BMs could also be 20' or 40' container frames housing a combination of various types of BCs and even BCs WPB (with or without a shared
20 bathroom capsule).

Accommodation Capsule & Module "Servant" (BS) (Fig 53)

The BS would be composed primarily of a trolley carrying a vacuum cleaner, a
25 water-pressure cleaner and possibly a tank sprayer, with an "arm" 90 regrouping all the flexible hoses.

This "arm" 90, which should extend to at least 3m to be able to reach any location in the BC, would be retractable on the trolley, possibly through a simple pulley
30 fitted with a counter-weight.

The electrical supply to this cleaning equipment could be possibly be done, preferably at low voltage for safety reasons, through the set of rails of the trolley or simply by a (spooled) cable connected to an outlet located at one end or in the middle of the BM.

5

The end of the "arm" could possibly be fitted with a "command handle" regrouping the switches commanding the different machines and could also be fitted with an electrical projector flooding with light the location being cleaned.

- 10 In a larger structure like a multi-storey hotel, the "Servant" could be more sophisticated, allowing the cleaning to be more automated.

The "arm" and the trolley could for example be motorized/robotized and programmable to clean semi-automatically all the (or the pre-selected) BCs of a
15 module in a row before being moved to the next module or trolley, and so on.

BMAS applications (Fig. 65, 76, 85 & 86)

The BMAS applications, which would normally be built of aluminium or steel alloys
20 (at least for the larger models), could be at least pre-constructed in the factory(ies) producing the BMs and the technical modules, which could itself be located virtually anywhere (accessible to ISO containers).

The similar 40' BMs 156 (and possibly 20') or their F2F combinations 115 could
25 be produced in an industrial manner, pre-furbished, with pipes and cables pre-installed and the outside external "skin" at the back (pre-fitted with "marine" windows, if/when applying) and possibly at the top and on the sides welded on the container frame, which could be used as a structural part of the application.

30 It is important to note that the space between the skin of the containers and the BCs could be filled before or after that with adequate (closed cell) foam, possibly pre-formed or injected in-situ.

This is intended to ensure not only the proper sound insulation of the BCs but also, in case of floating applications, the floatability and un-sinkability of the vessel.

- 5 These BMs could then be fastened and welded together at the assembly location / the shipyard to become part of the application / hull.

Other components such as the "technical modules" 116 152 housing the machinery and the laundry & storage, but also some of the common facilities such
10 as the kitchen, etc. could also be pre-fitted in containers, thereby allowing the saving of considerable amounts of time and money compared to traditional construction methods.

No specific material is imposed for the construction of the BMAS Cruisers or
15 Catamarans.

It seems however that a construction in thick Aluminium alloys would take best advantage of the ship skeleton constituted by the frames of the ISO container
modules.

20

The smaller BMAS catamarans could actually be sold to amateur builders or smaller yards as semi-prefabricated "kits", with all elements cut and formed by the licensed yard(s) and shipped in containers, to be welded and assembled locally.

- 25 The yard(s) licensed by the BMAS licensor could actually supply not only these aluminium elements but also the container modules, as well as the spars and rigging, together with the technical supervision for the assembly/construction and certification.

Claims

1. A Modular Accommodation System (BMAS) comprising one or more
5 Capsules or Cabins (BCs), preferably equipped with specially designed
beds (BBs), designed to be fitted into an ISO container frame to form
one or more Modules (BMs), preferably equipped with a semi-
automatic cleaning system (BS) and preferably combined, possibly
face-to-face (F2F), on one or more levels, thereby allowing the speedy
10 and easy construction of very compact, economical yet attractive,
collective housing facilities such as "Observer" Stand-alones,
"Shelters", "Step combinations", "Motels", "Camps", "Hotels/Youth
hostels", "River cruisers/Floating hotels", "Cruising catamarans", etc...
when complemented with the usual "shared facilities" or simply
15 "integrated in a building"
2. The BMAS of claim 1 wherein the Capsules or Capsules (BCs) consist
of a prefabricated, compact, sound insulated "private quarters" (i.e.
bedroom and bathroom) accommodating 1 up to 4 users who can also
20 use it to relax, work, play, listen and view "immersive" multimedia, etc.
3. The BMAS of claim 1 or 2 wherein the BCs forming a said BM are
linked to the ISO container frame through silent blocks or equivalents
and externally covered with flexible foam and/or pre-formed rigid foam,
25 for proper sound/vibration and thermal insulation.
4. The BMAS of anyone of the previous claims wherein the BCs are fitted
with an angled front part, protruding outside the container frame,
allowing not only to increase the required depth to the said BC to
30 provide for full length adjustable beds but also to heighten the entrance
to the said BC, giving the user the unusual but pleasant impression of
walking down a few steps into the said BC, reminding that of going
from the cockpit into the cabin of a sailing boat.

5. The BMAS of claim 4 wherein the said difference of level, associated with the angled design of the said front part of the BCs, allows also for a narrower corridor between said BCs; from about 4' (1.2m) wide up to the waste-level (i.e. about 3' (90cm) over the walking path, where the width is not so important), it becomes wider to reach about 8' (2.4m) at eye level, which gives to the user the impression of a wide corridor.
6. The BMAS of claim 4 or 5 wherein the entrance into the said BC is done through the said front part by sliding sideward part of the angled frame.
7. The BMAS of anyone of the previous claims wherein two BMs are designed to be combined, typically "Face-to-Face" (F2F), on one or more levels, reaching a width of only about 24' (7.3m), including a built-in central corridor.
8. The BMAS of anyone of claims 4 to 7 wherein the BC is constituted by two interlocking shells and the said front part.
9. The BMAS of anyone of the previous claims wherein the BCs forming a BM furthermore comprising a semi-automatic cleaning System (BS), which comprises:
- A set of rails, running over the whole length of each BM, which are next and parallel to those of the BC's sliding doors.
10. A foldable trolley designed to be used with the BMAS of anyone of the previous claims, manual or motorized, running on these rails, usable to carry luggage, catering and/or other goods (like a usual hotel room cleaning trolley), which may be stored in a folded position at the end of each BM.

- 5 11. A removable cleaning equipment system designed to be used with the BMAS of anyone of the previous claims 1 to 9 and with the trolley of claim 10, which, placed on this trolley, will have one or more extendable (possibly "balanced") arms, which will be entered into the BC to vacuum clean it thoroughly, to wet clean the bathroom, the window and all other "wet cleanable" surfaces, and possibly to sanitize and/or deodorize /perfume the bathroom.
- 10 12. The BMAS of anyone of the previous claims comprising a bed apparatus (BB), preferably motorized, which can be fully converted to a chair, with all intermediate configurations suitable for relaxation.
- 15 13. The BMAS of claim 10 wherein the said BB apparatus is a combination of several rigid articulated frames (the shape of which varies with its "deformation" to become a flat bed, a relax couch/sofa or a straight chair and even in a vertical position, for example for storage), fitted with specially designed "converters" in lieu of the usual foundation slats, and wherein these frames correspond to the "(leg) support", "seat", "back" and "headrest" sections of the apparatus.
- 20 14. The BMAS of claim 11 wherein the said "converters" have basically two positions, "Hard" and "Soft", between which they can be rotated around a pivot fixed on the relevant said frame:
- 25 - In the "Hard" position, the "converter" is rotated so that the slat bearing the mattress is a rigid metal or composite profile, which height can be adjusted to give an adequate "profile" to the mattress.
- 30 - In the "Soft" position, the "converter" is rotated so that the slat bearing the mattress is a flexible wood (or plastic, single or twin) slat, fully covered with a thick foam "cushion", which "increases" the mattress thickness accordingly.

15. The BMAS of claim 12 wherein the said rotation between the "Hard" and "Soft" positions is done by pulling a cable fixed on each "converter" of a row or, for example, by pushing or pulling a rigid bar linking each "converter" in that row.
- 5
16. The BMAS of claim 13 wherein the said rows of "converters" lining the frames of the "Seat" and "Back" sections in the chair configuration are mounted in "opposite" directions, so that the "developed" distance between these two parts is increased when switching the "converters" from "Soft" to "Hard".
- 10
17. The BMAS of claim 14 wherein each of the four sections of the apparatus has the "converters" set in "Hard" or "Soft" position, depending on the actual configuration of the apparatus:
- 15
- The converters of the "(leg) Support" and "Headrest" sections are actually normally always in the "Soft" position (which means these 2 sections are possibly not equipped with "converters").
 - Those of the "Seat" and "Back" sections are in a "Hard" position when the apparatus is configured as a chair and in a "Soft" position when the apparatus is configured as a bed, and can be either for the
- 20
- intermediate in-between Relax configurations.

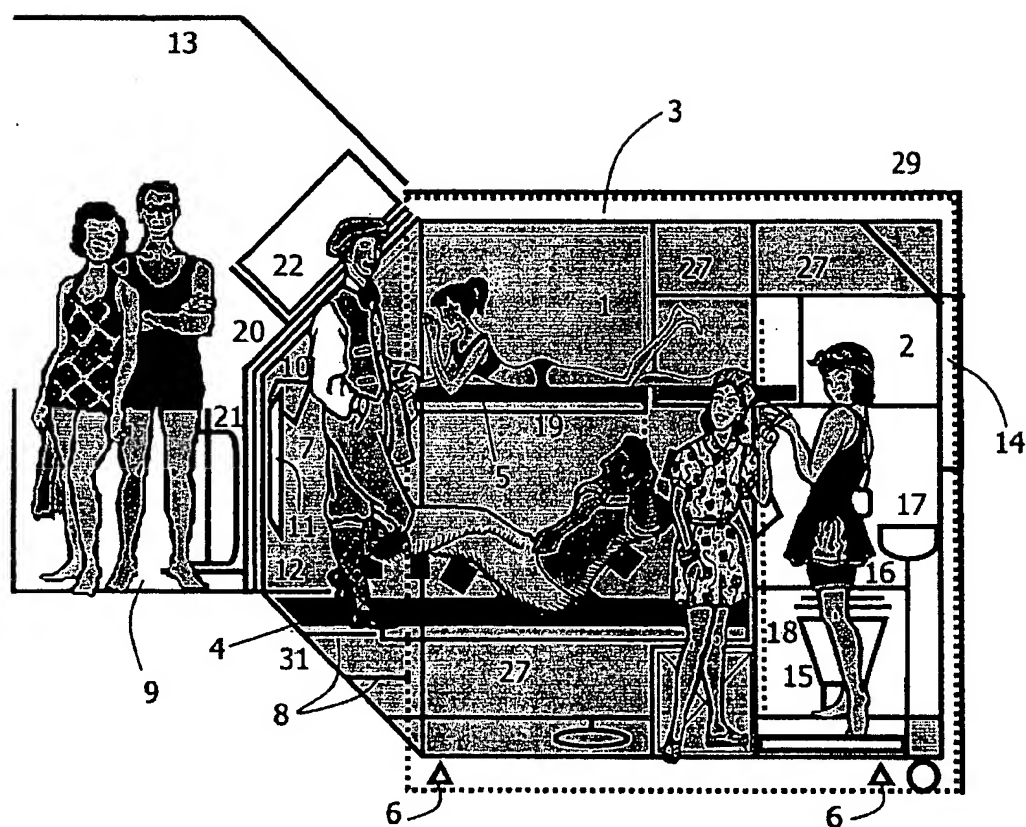


Fig. 1

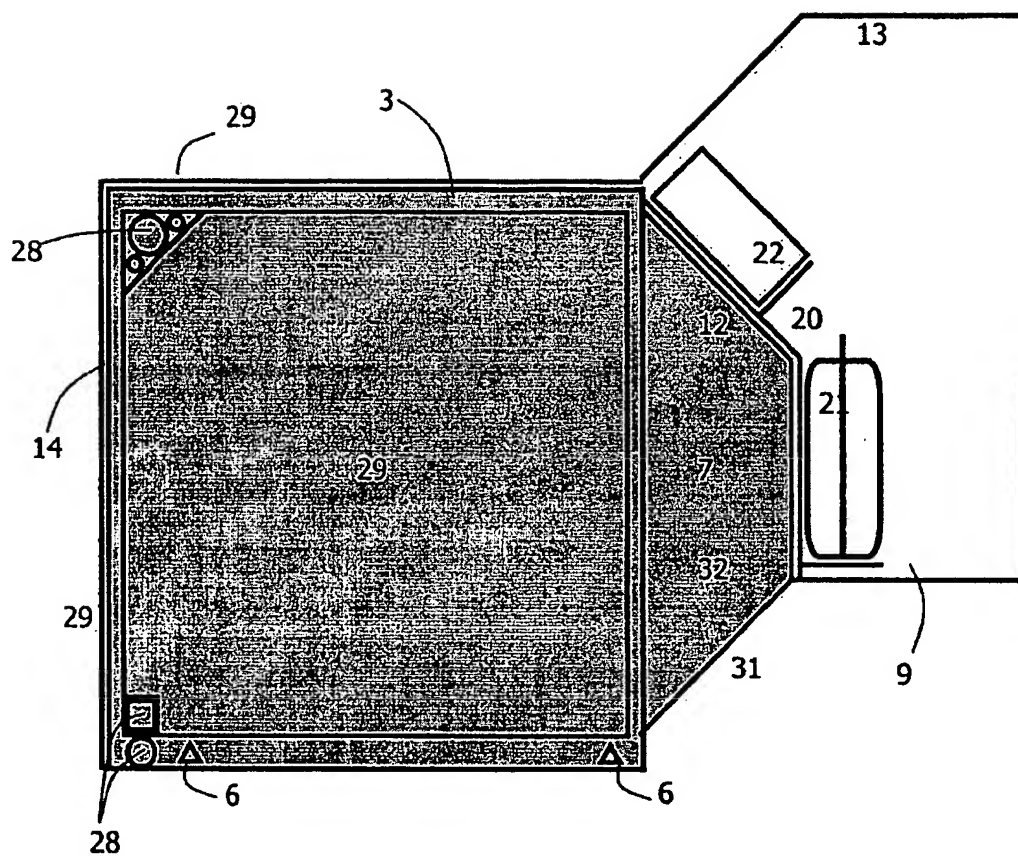


Fig. 2

10/508986

3 / 88

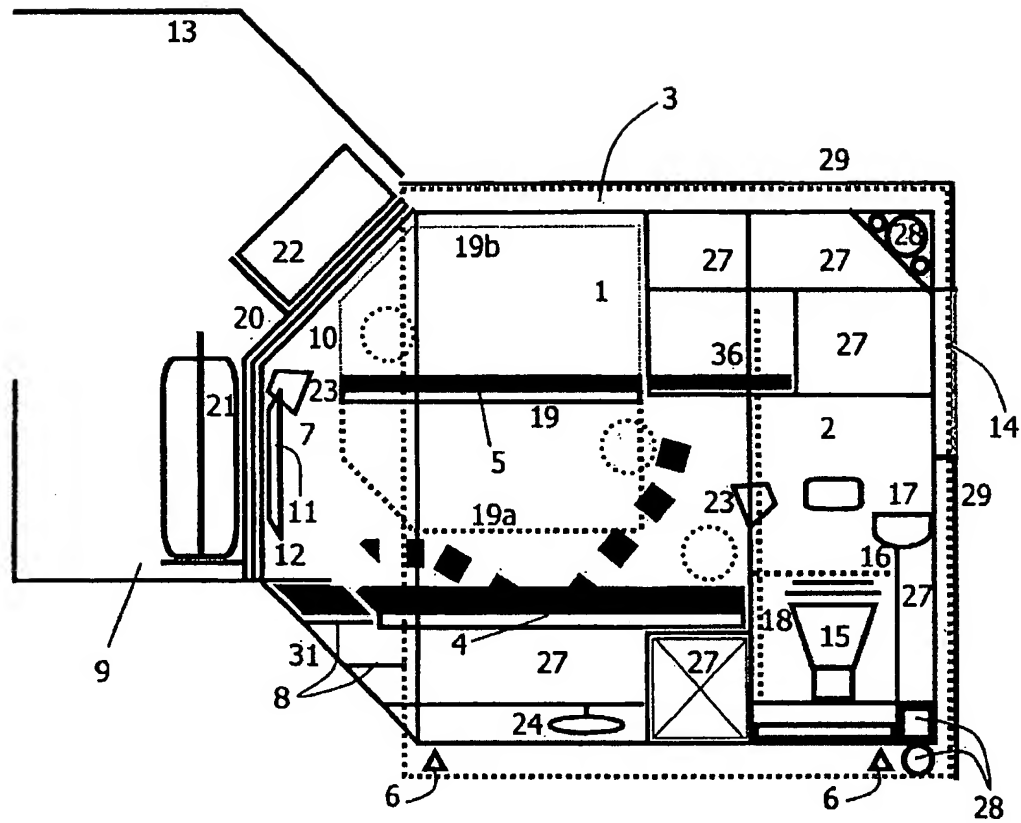


Fig. 3

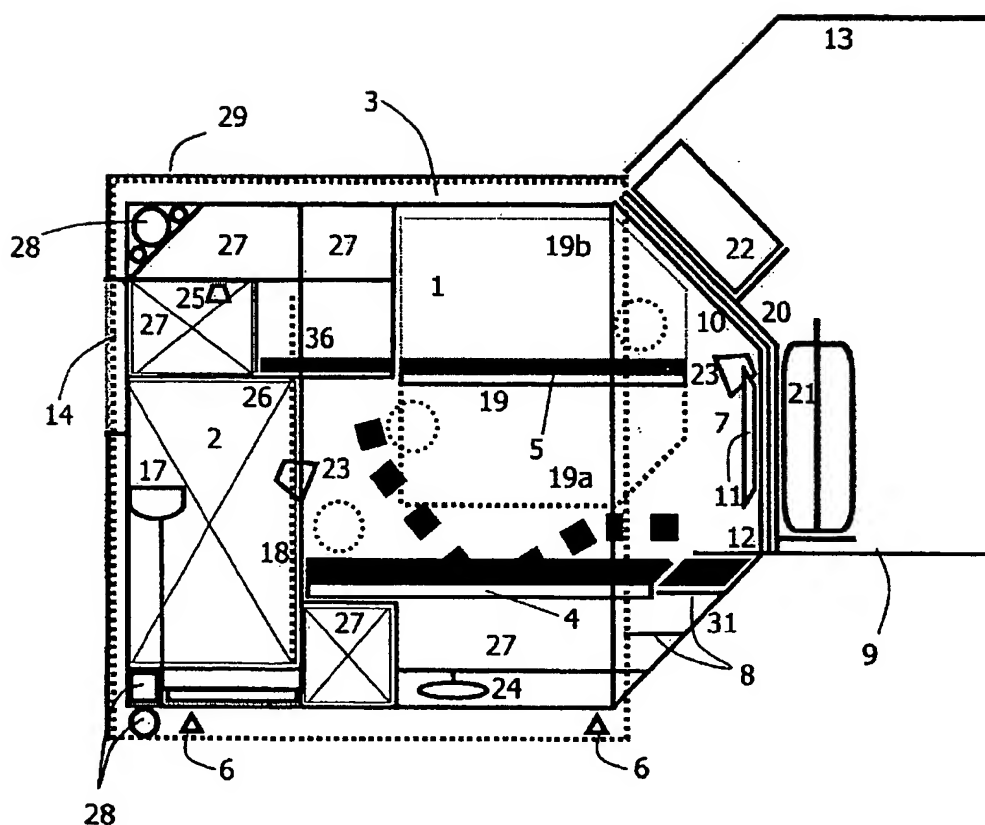


Fig. 4

10/508986

5 / 88

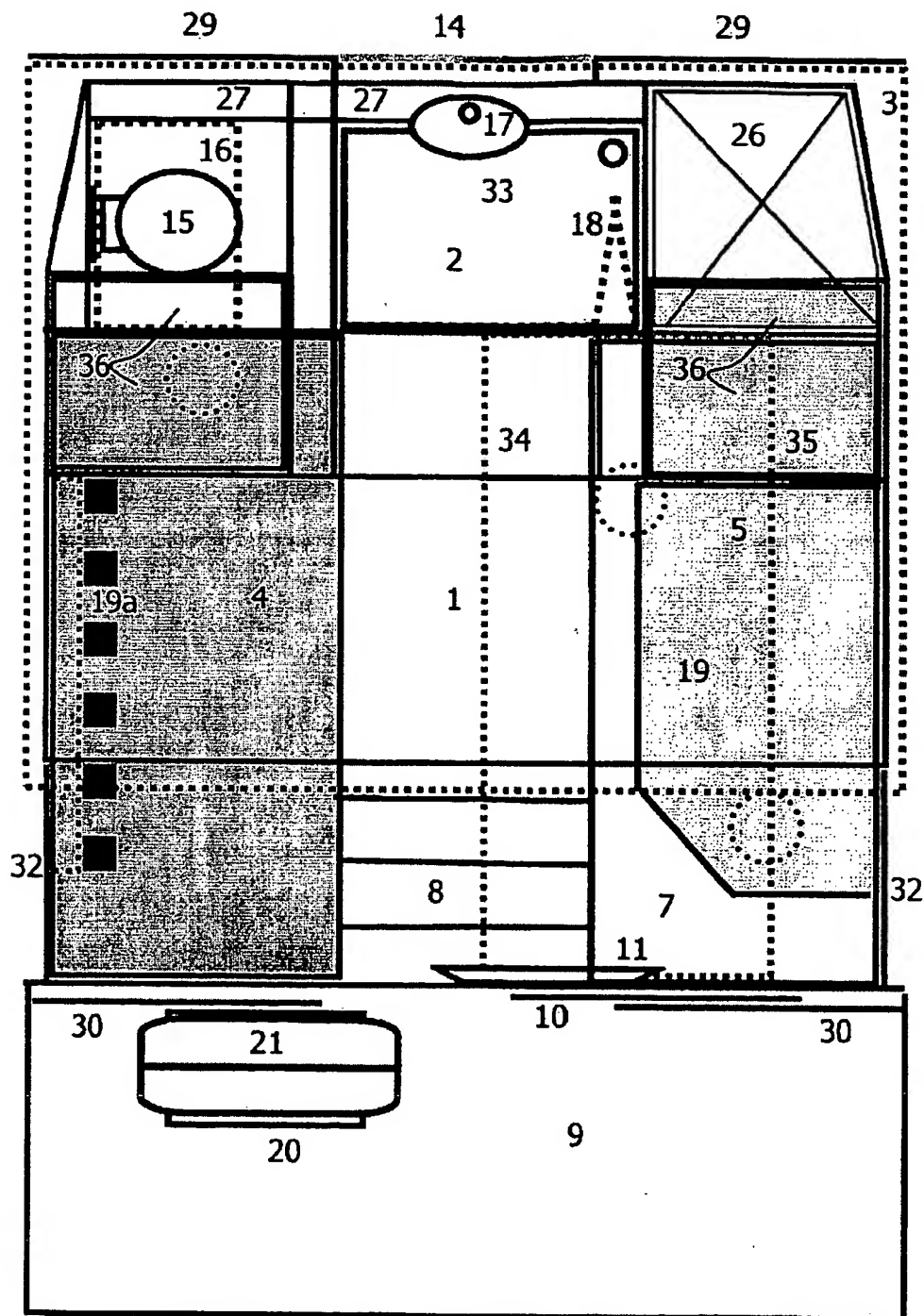


Fig. 5

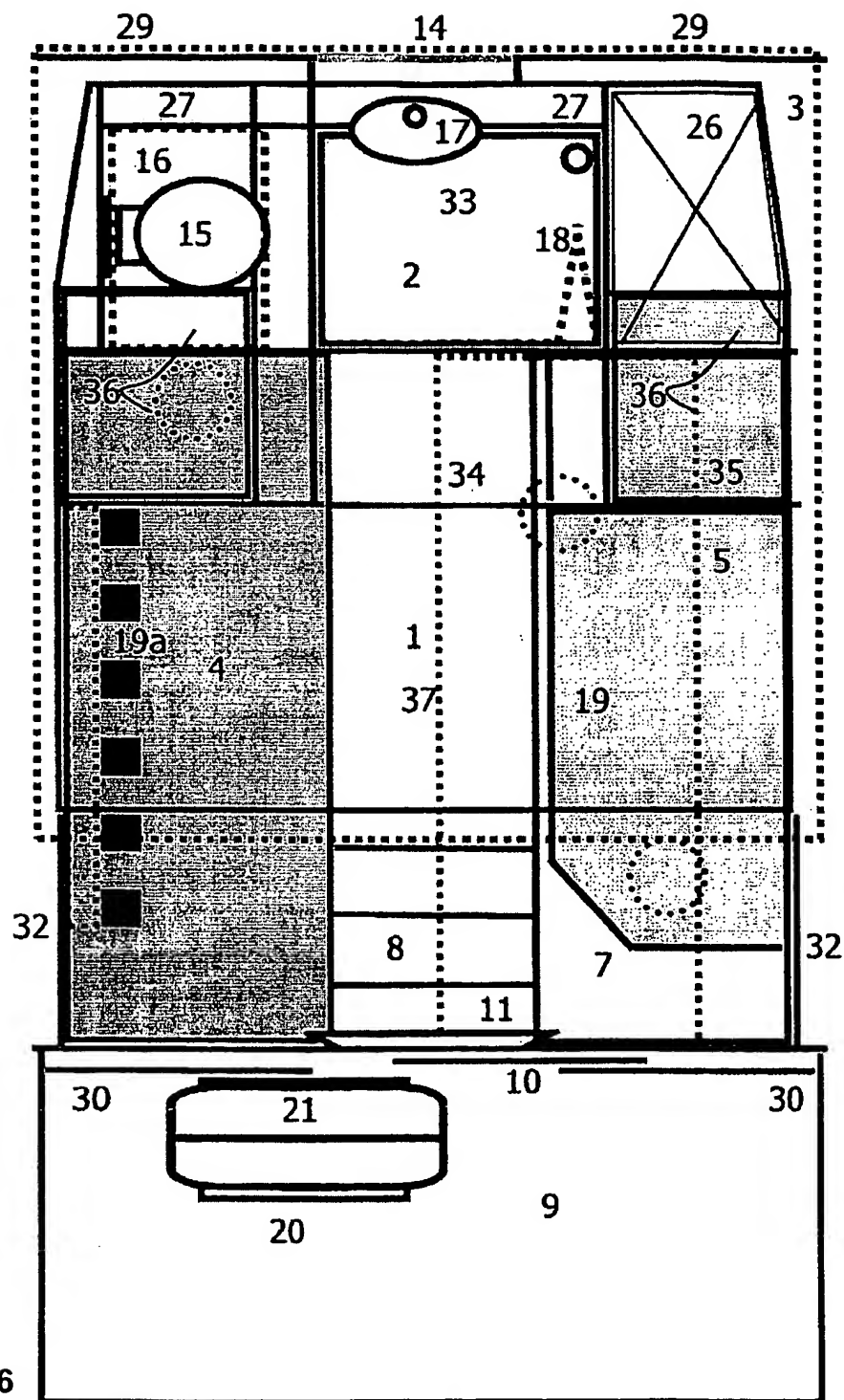


Fig. 6

10/508986

7/88

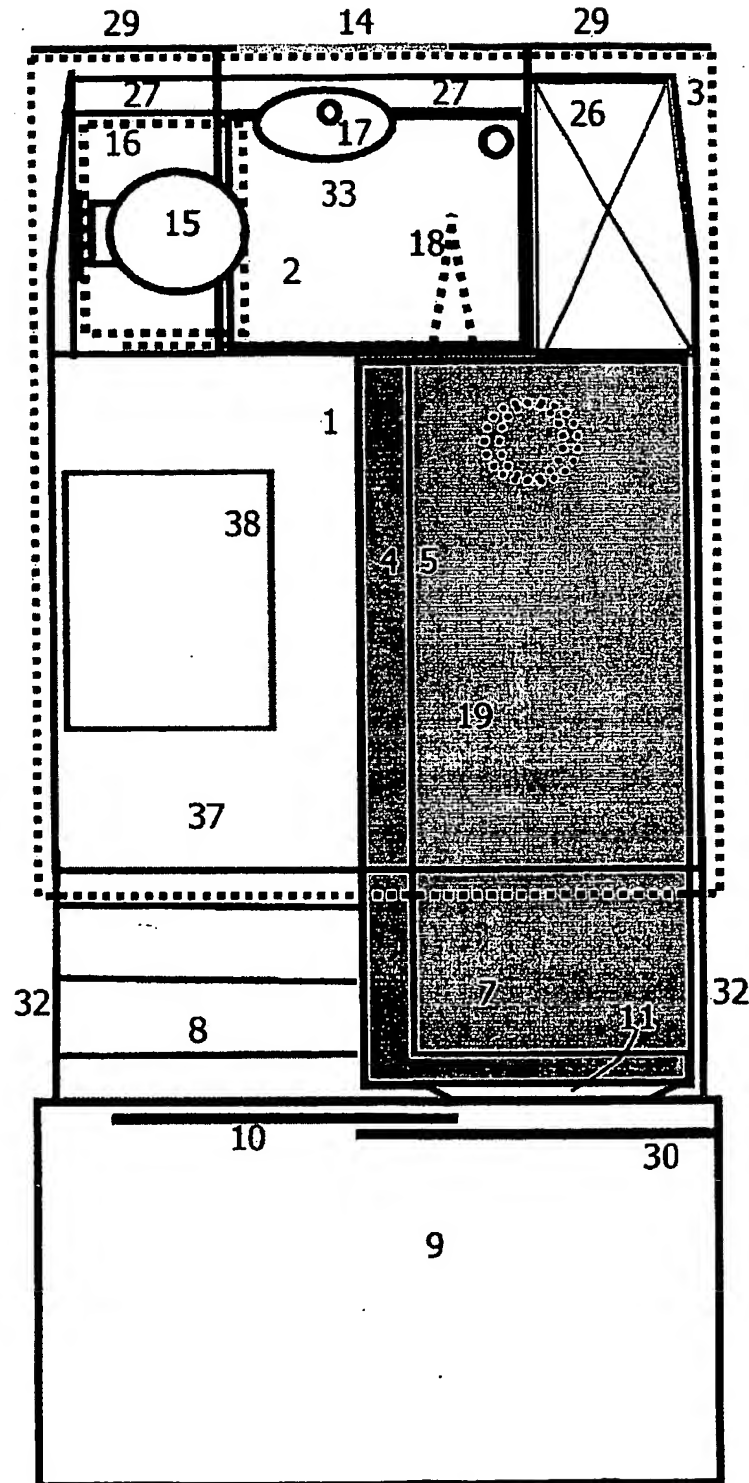


Fig. 7

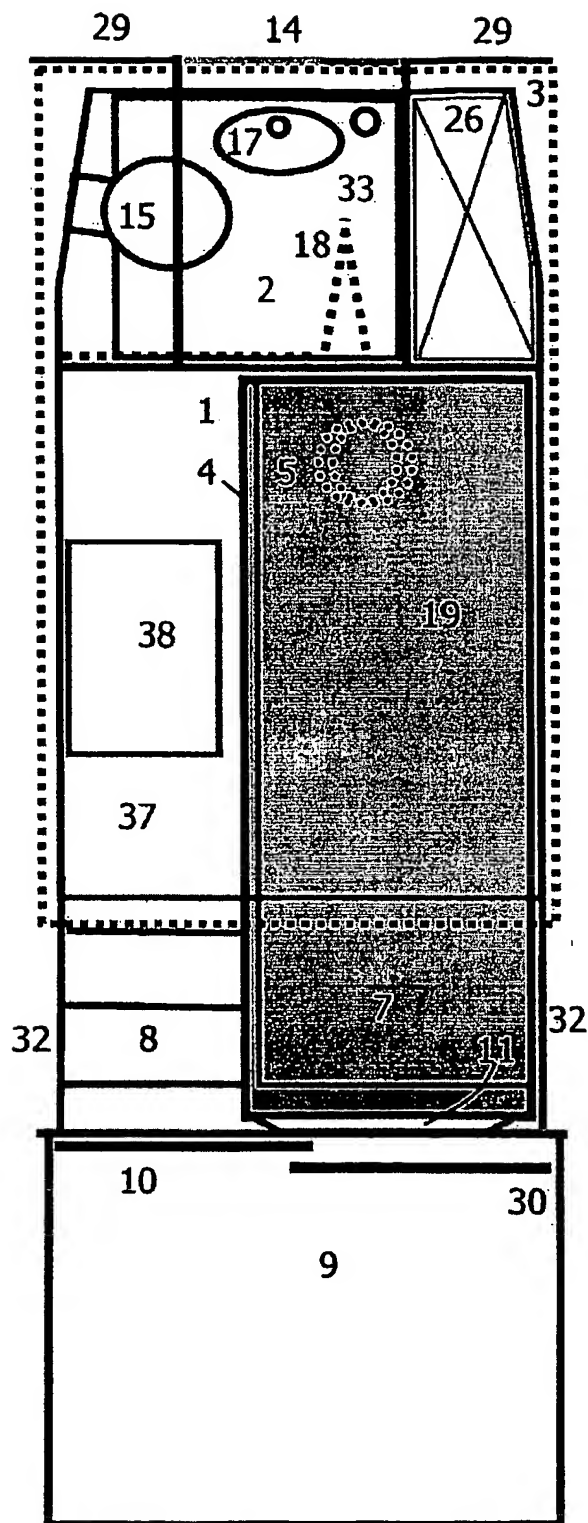


Fig. 8

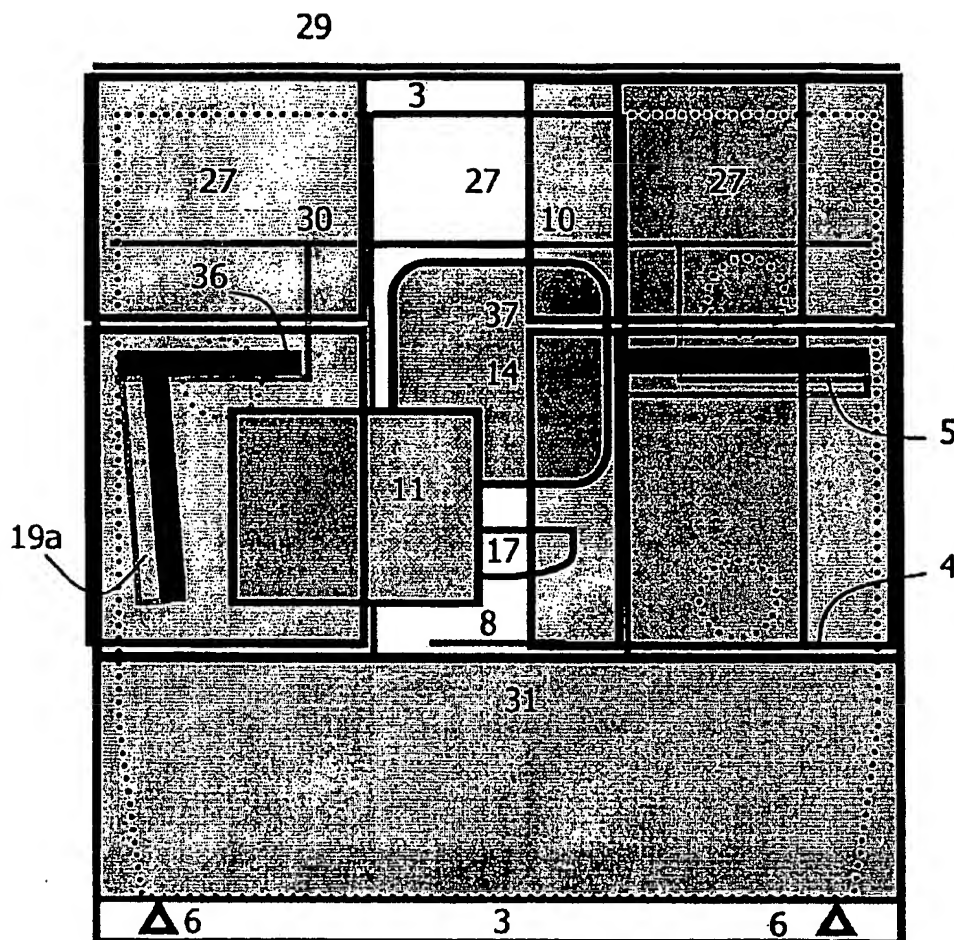


Fig. 9

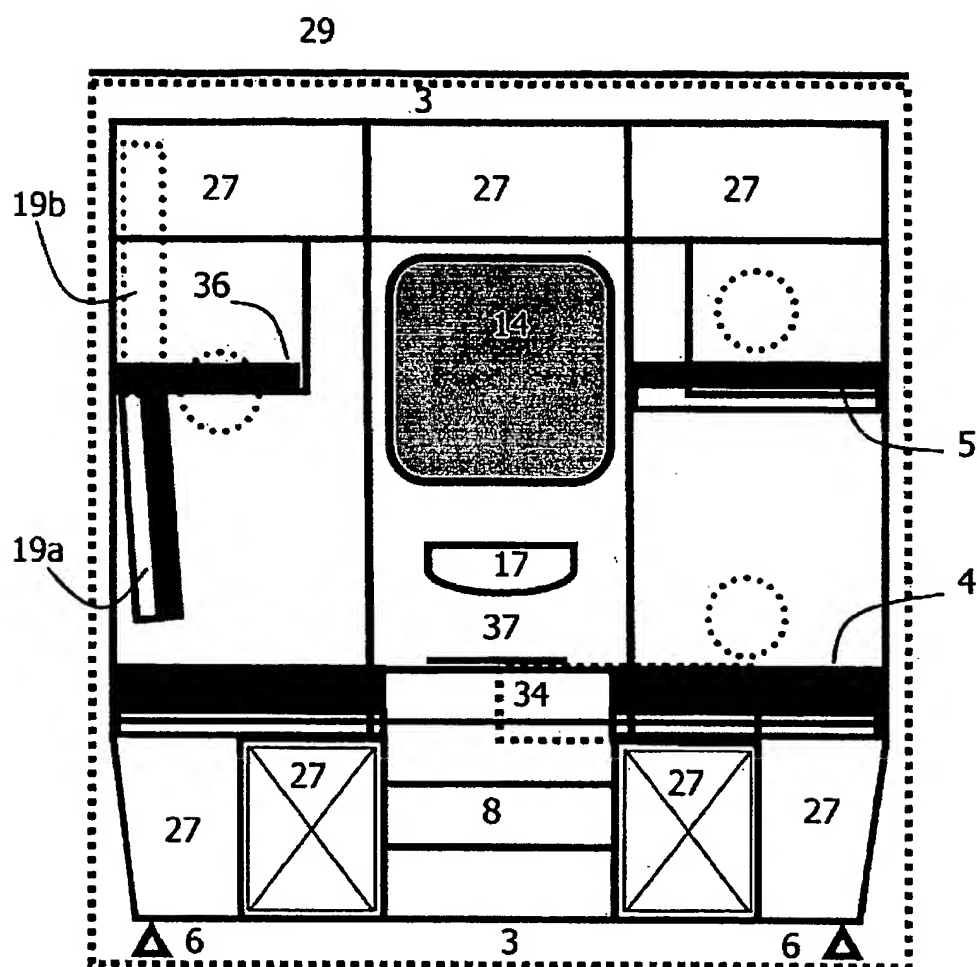


Fig. 10

29

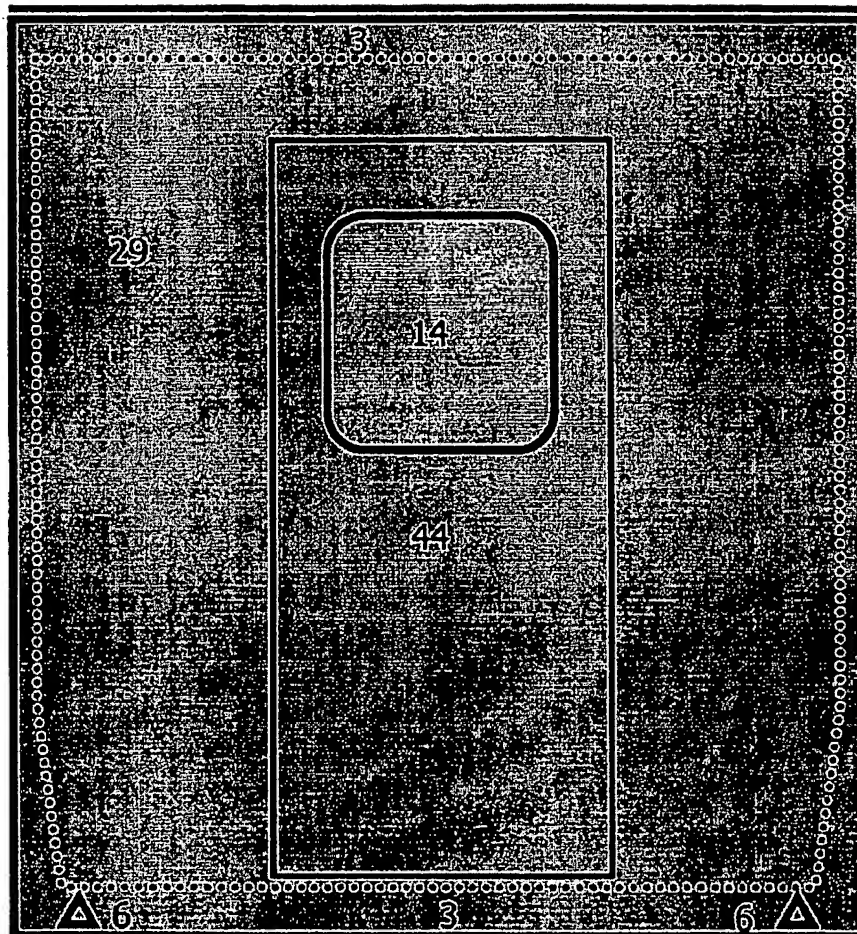


Fig. 11

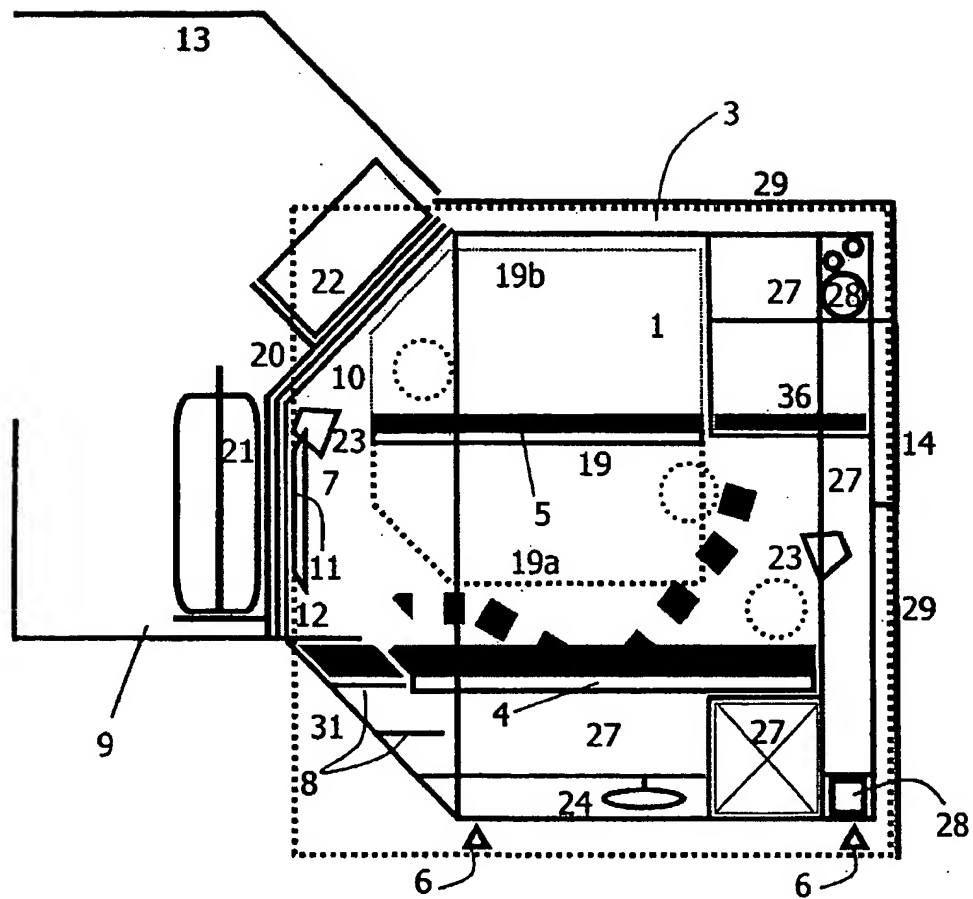


Fig. 12

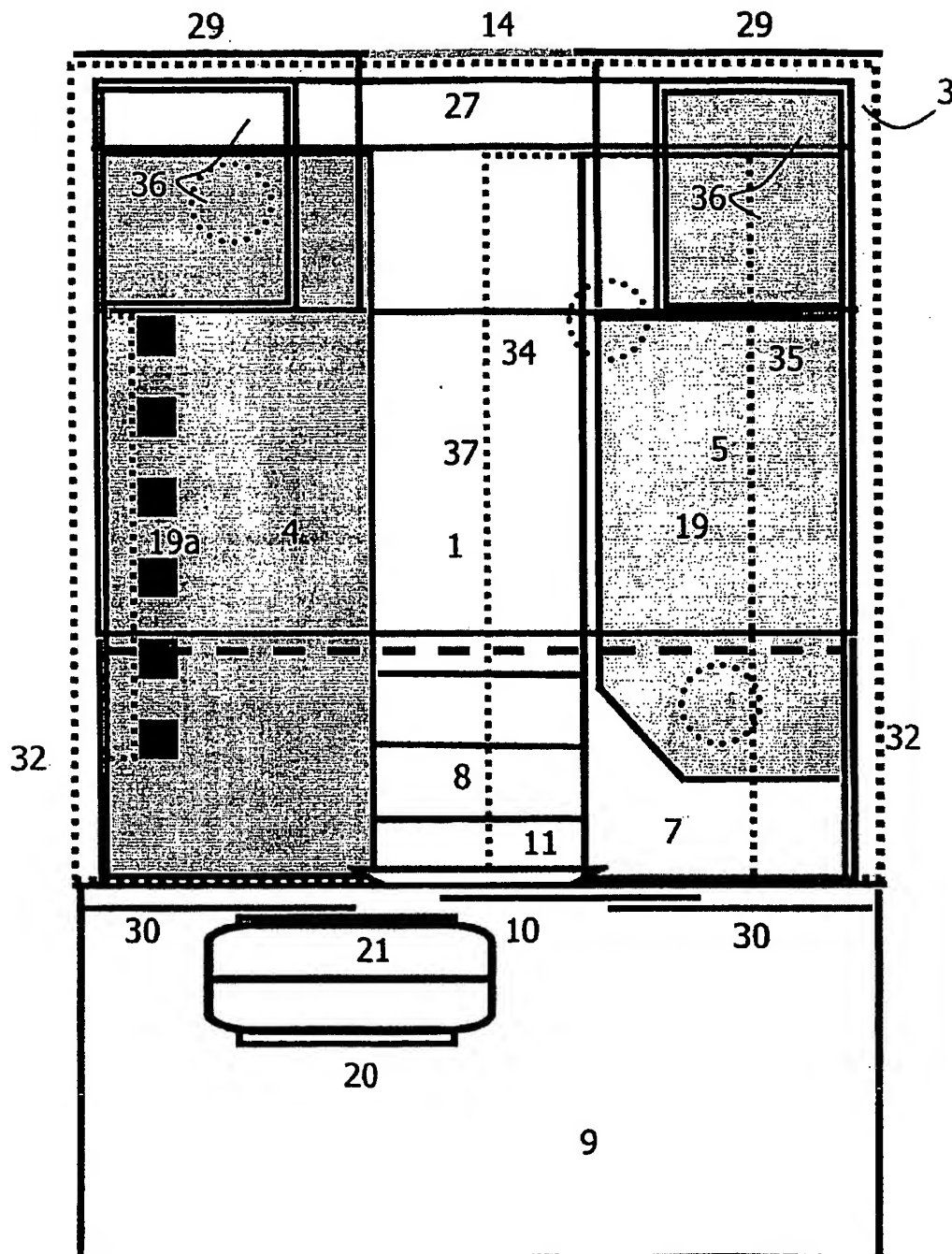


Fig. 13

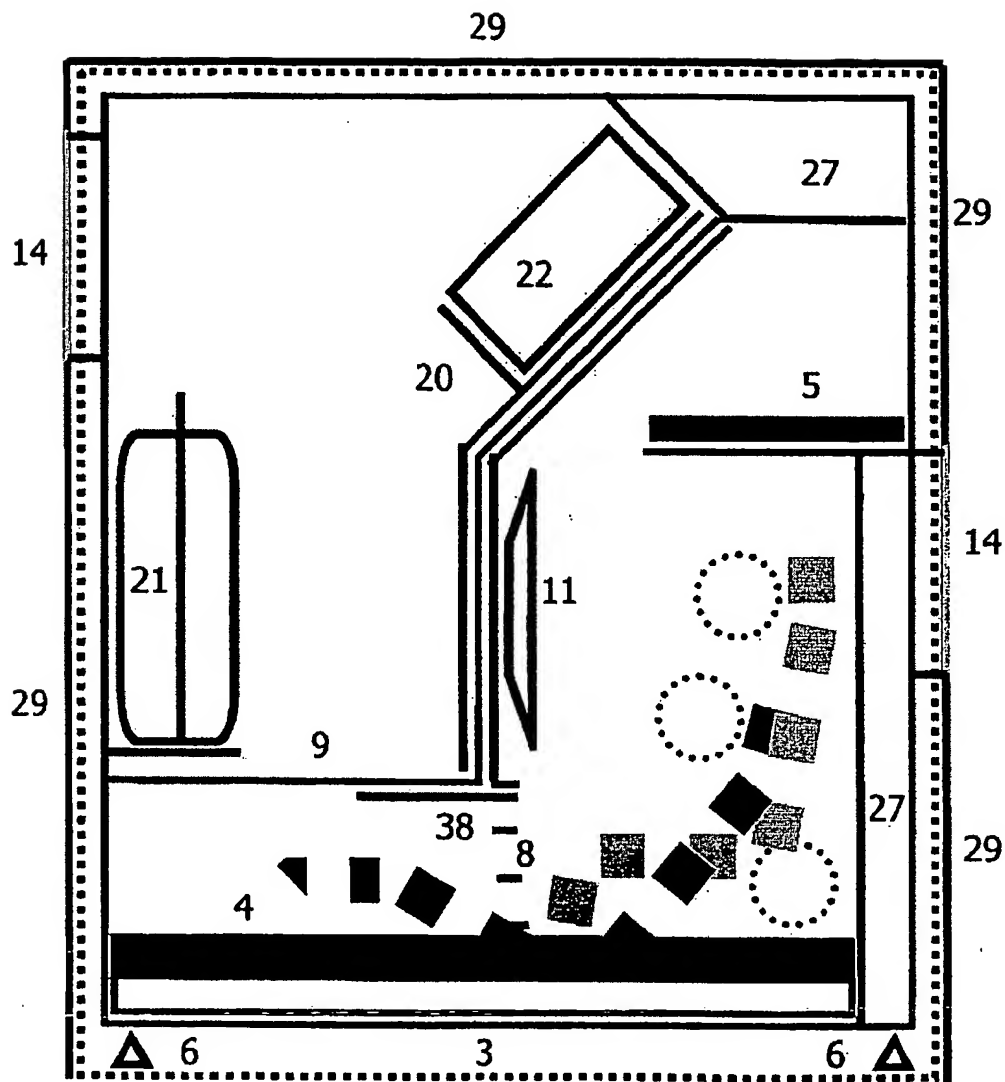


Fig. 14

10/508986

15 / 88

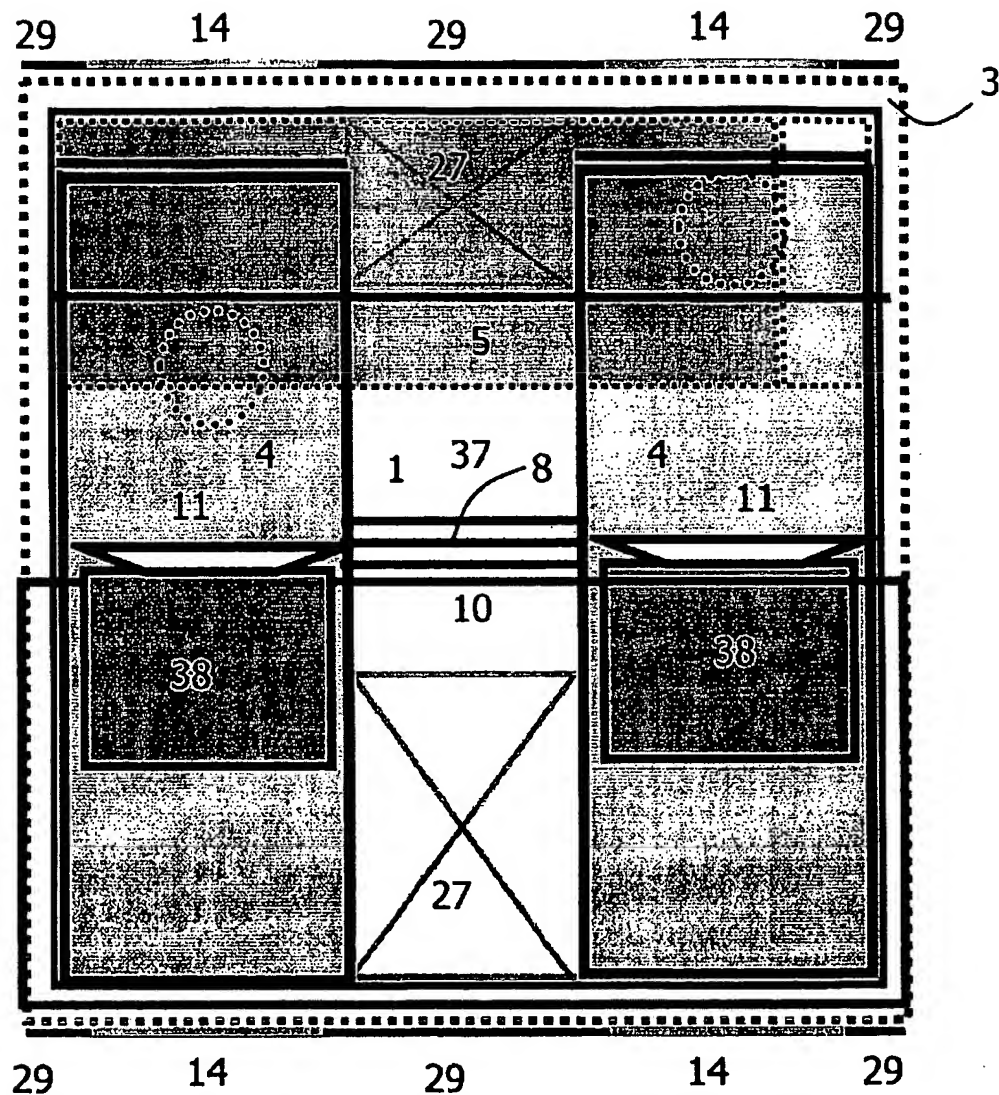


Fig. 15

10/508986

16 / 88

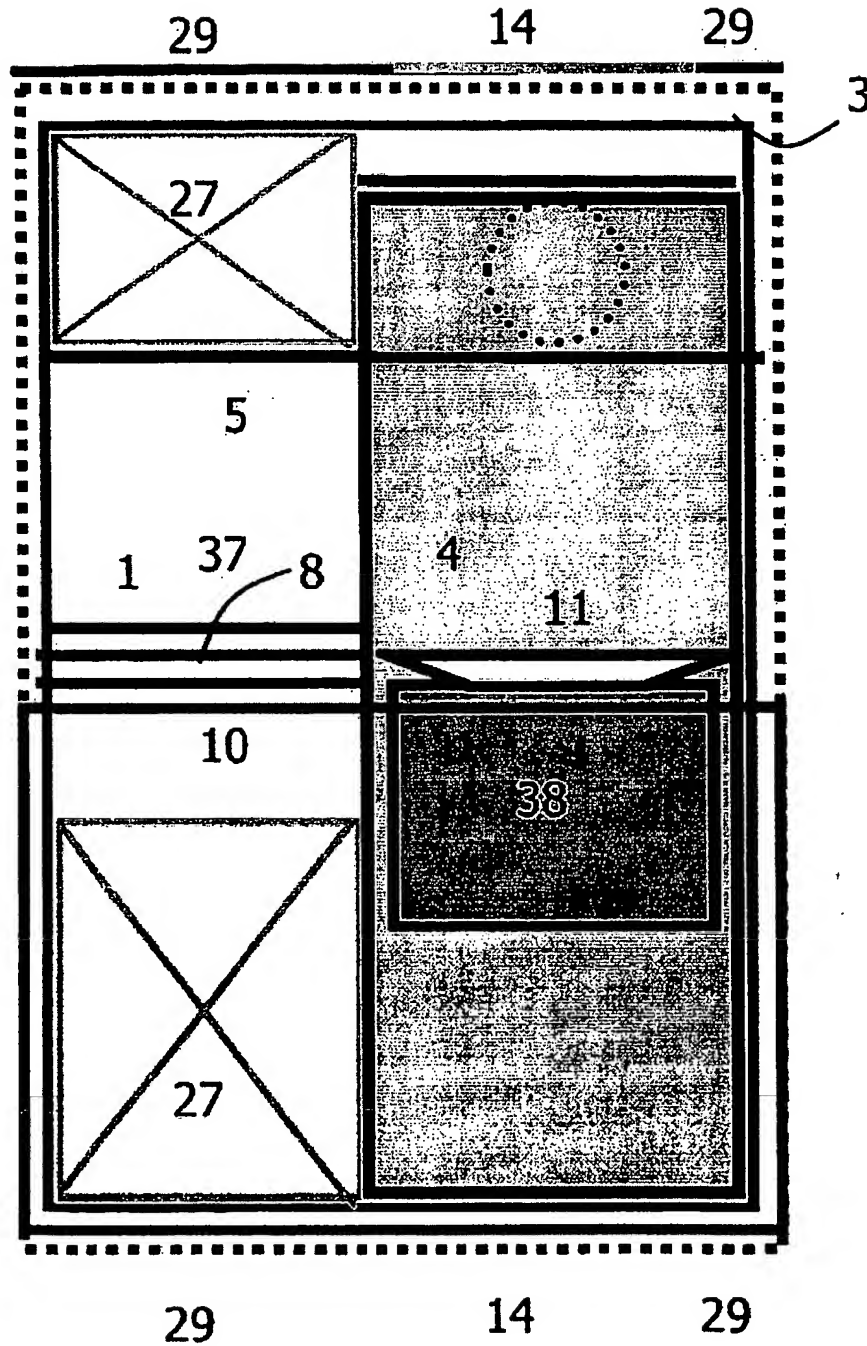


Fig. 16

10/508986

17 / 88

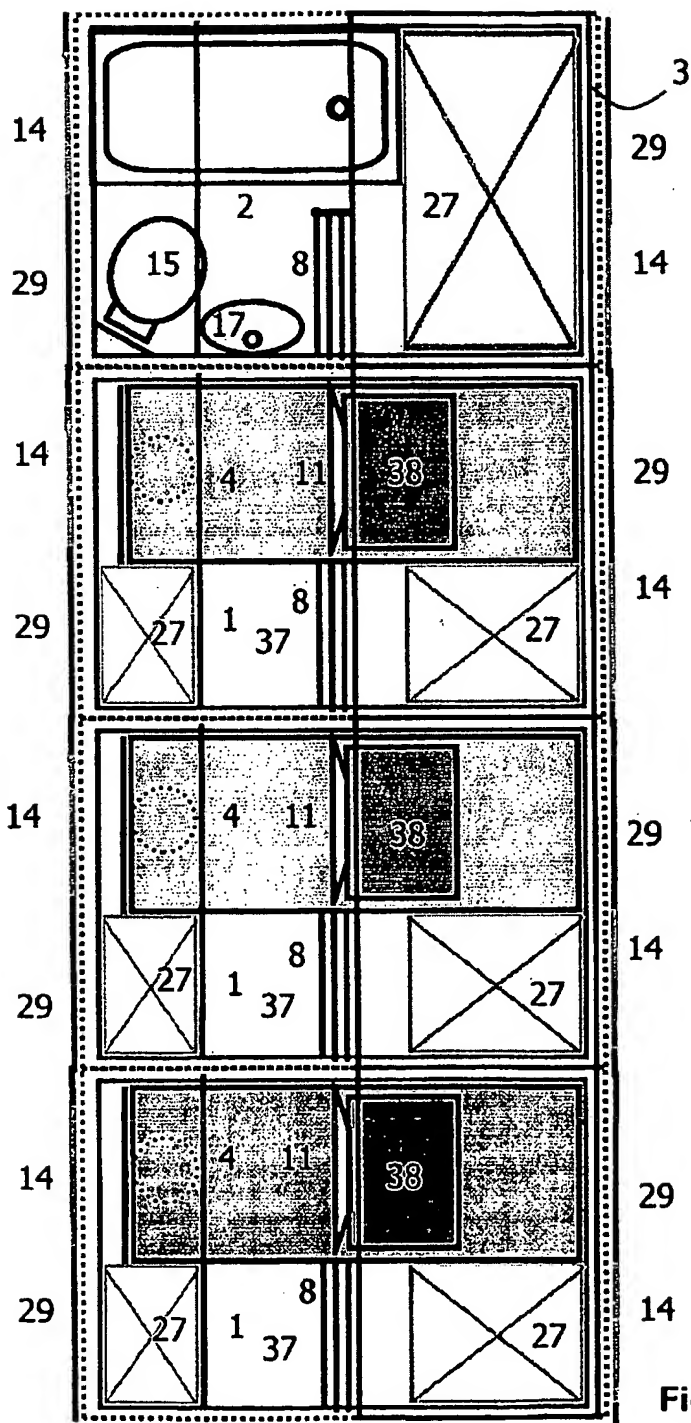


Fig. 17

18 / 88

10/508986

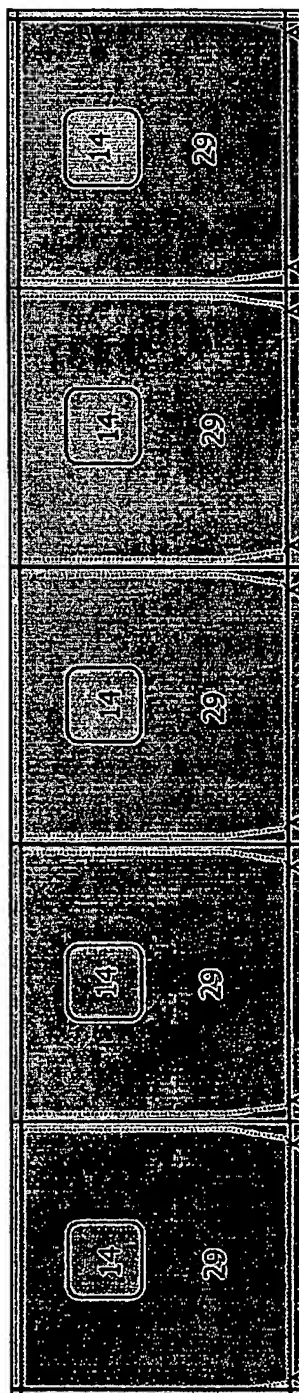


Fig. 18

10/508986

19 / 88

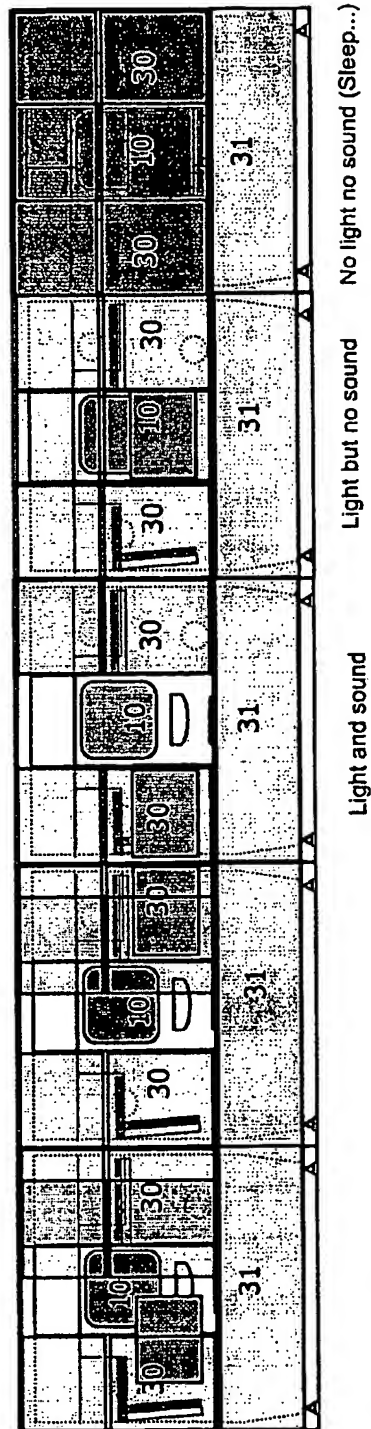


Fig. 19



Fig. 20

21 / 88

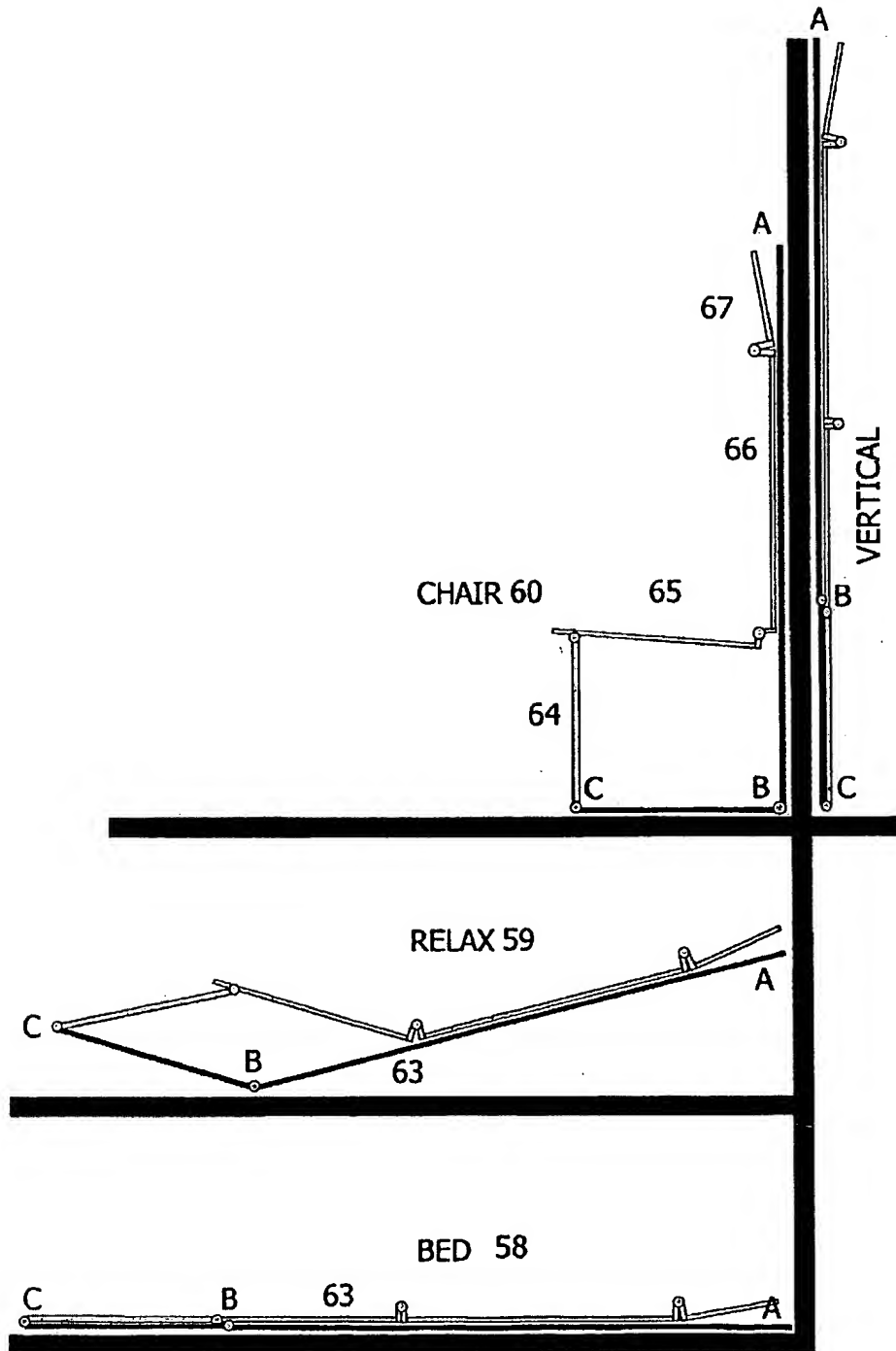


Fig. 21

22/ 88

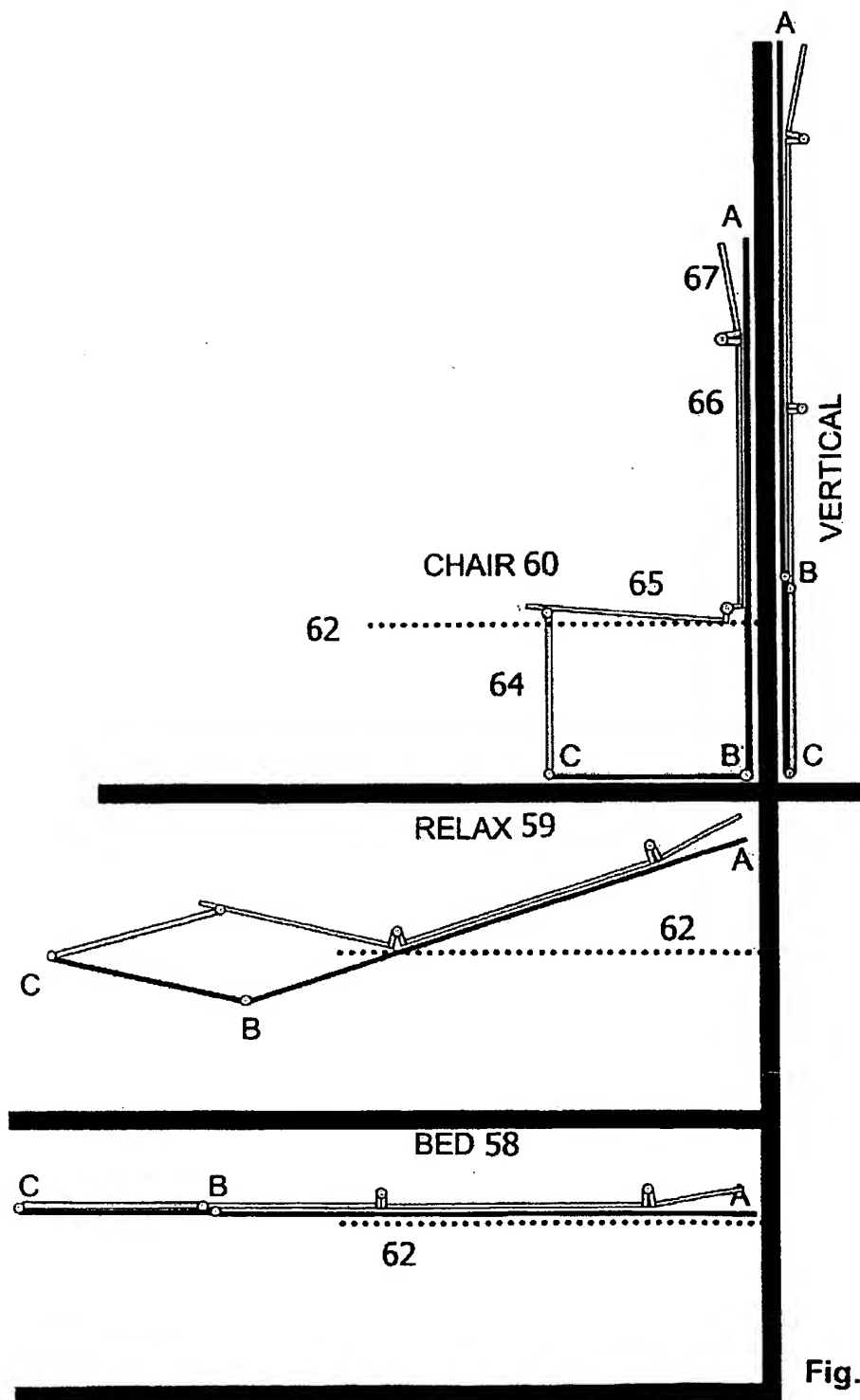


Fig. 22

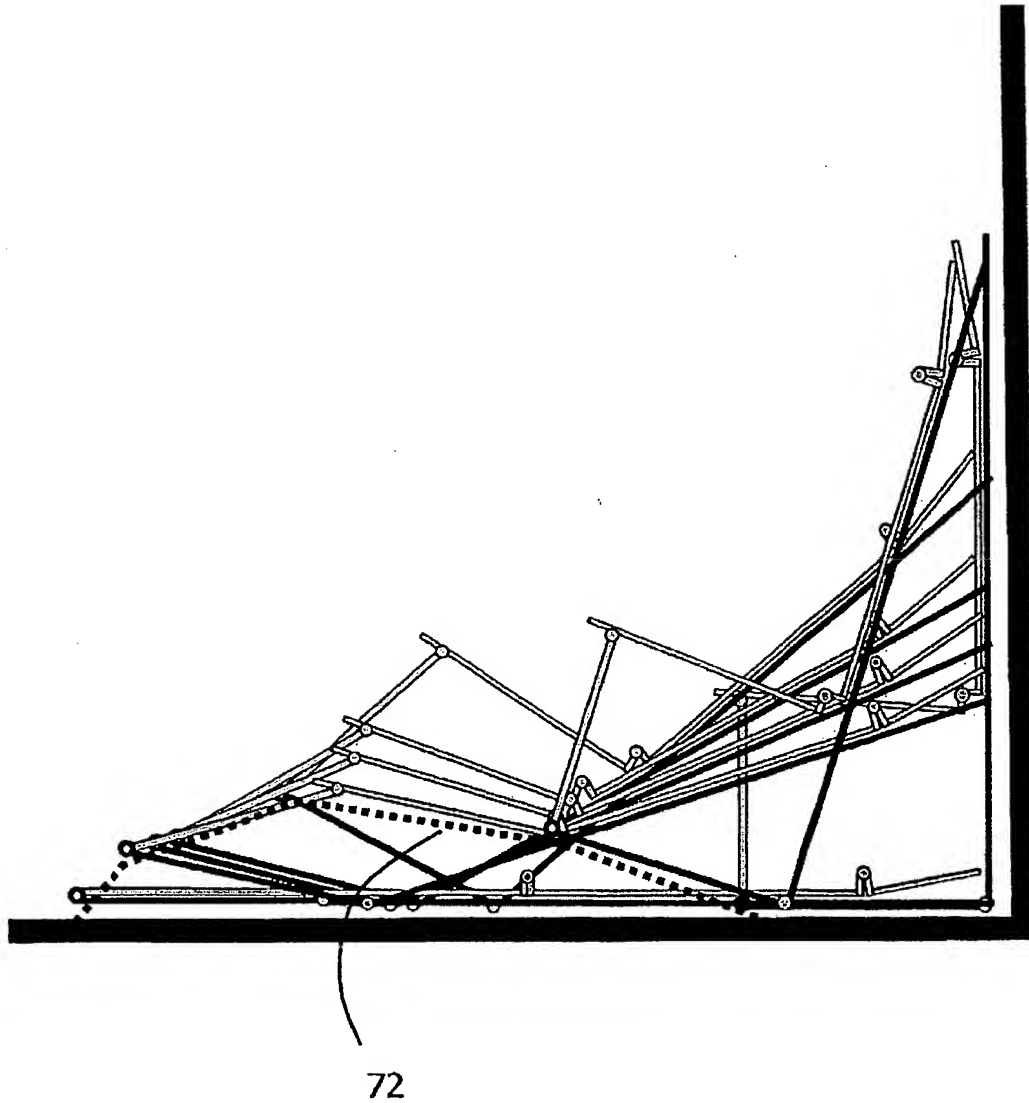


Fig. 23

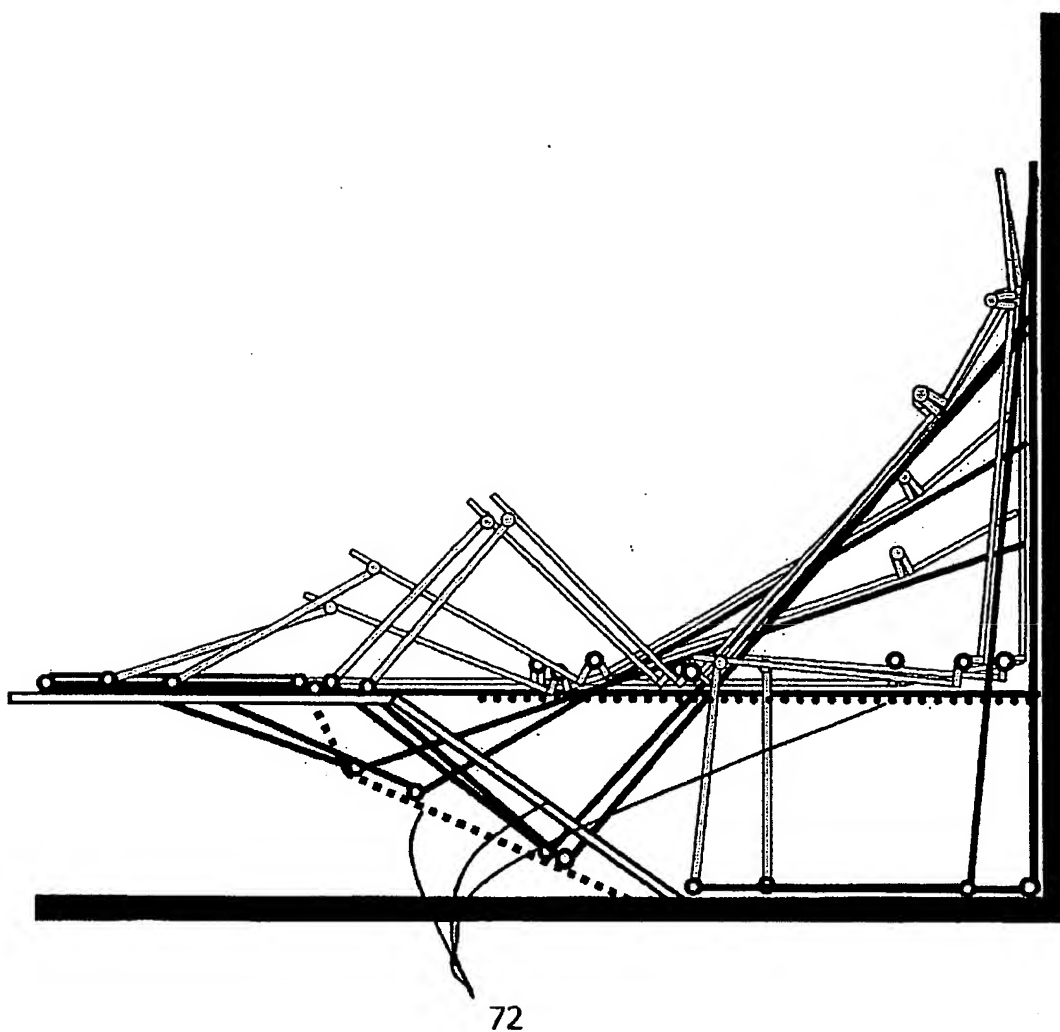


Fig. 24

10/508986

25/ 88

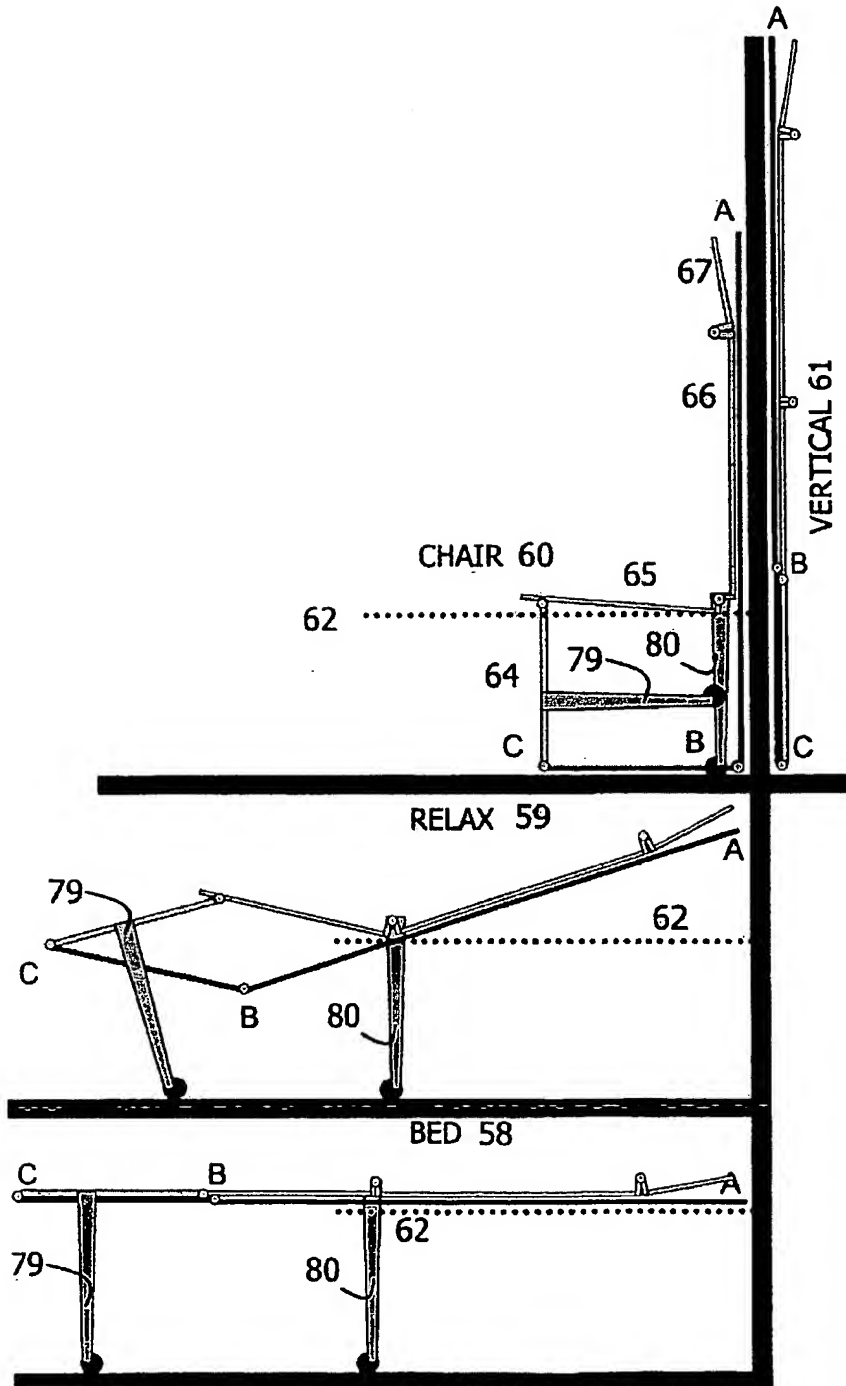


Fig. 25

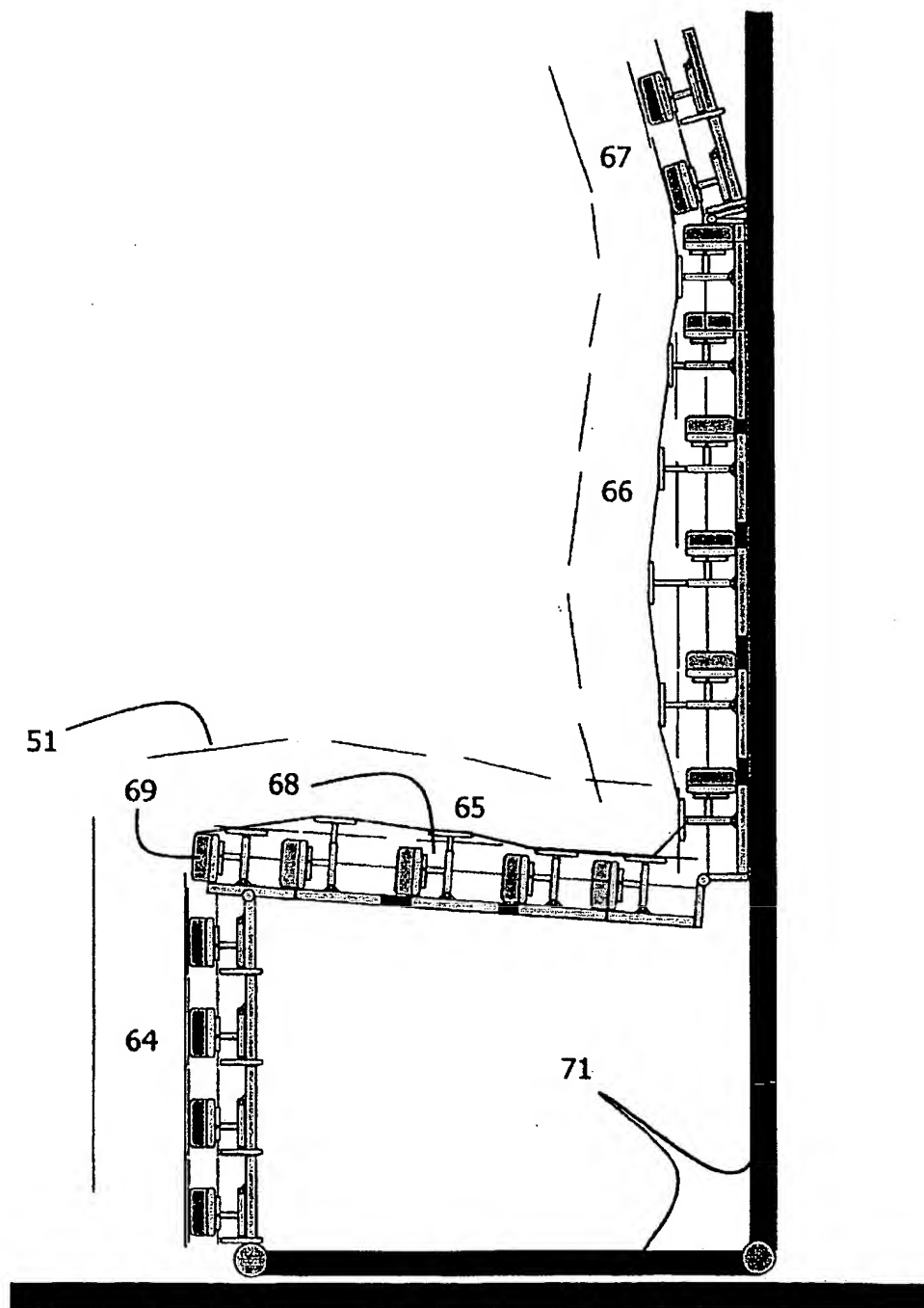


Fig. 26

27/ 88

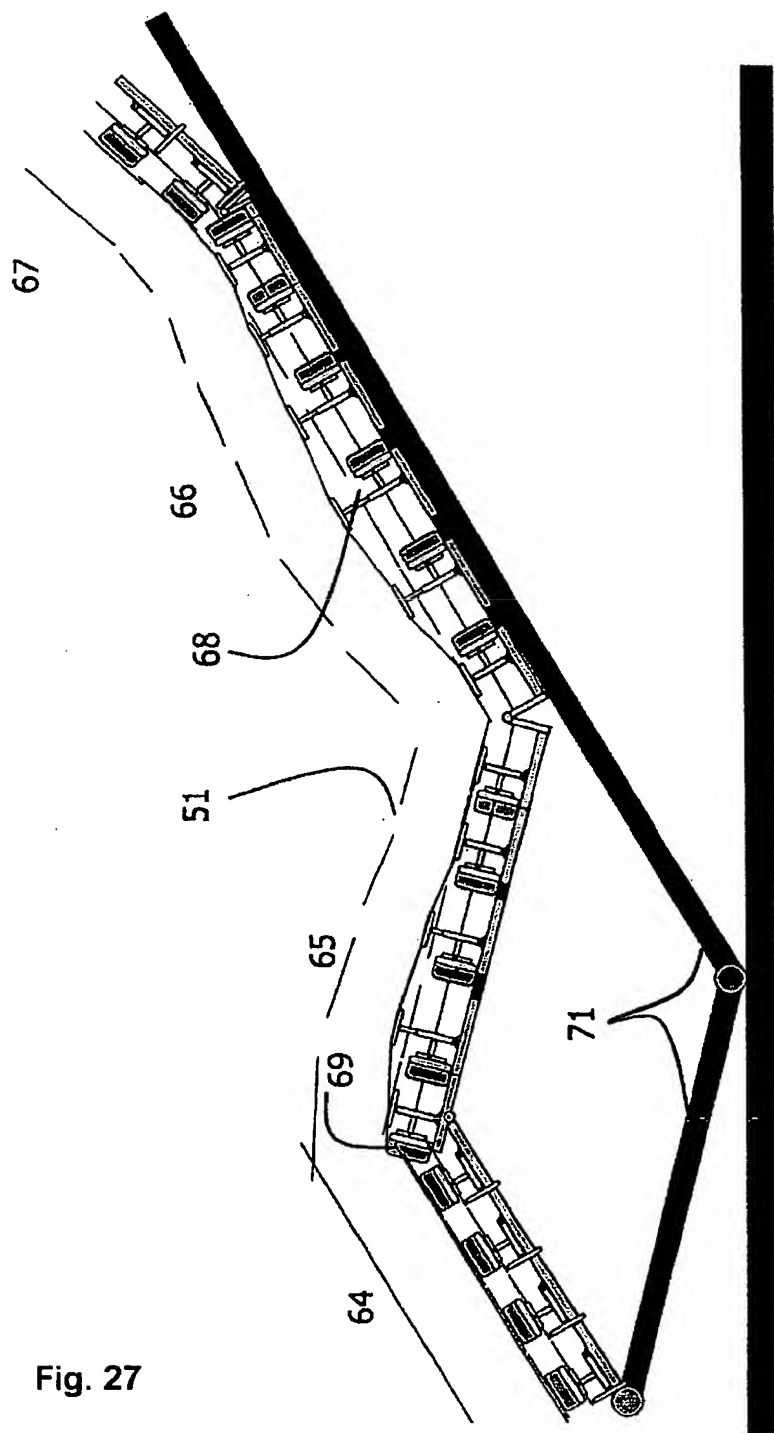


Fig. 27

28/ 88

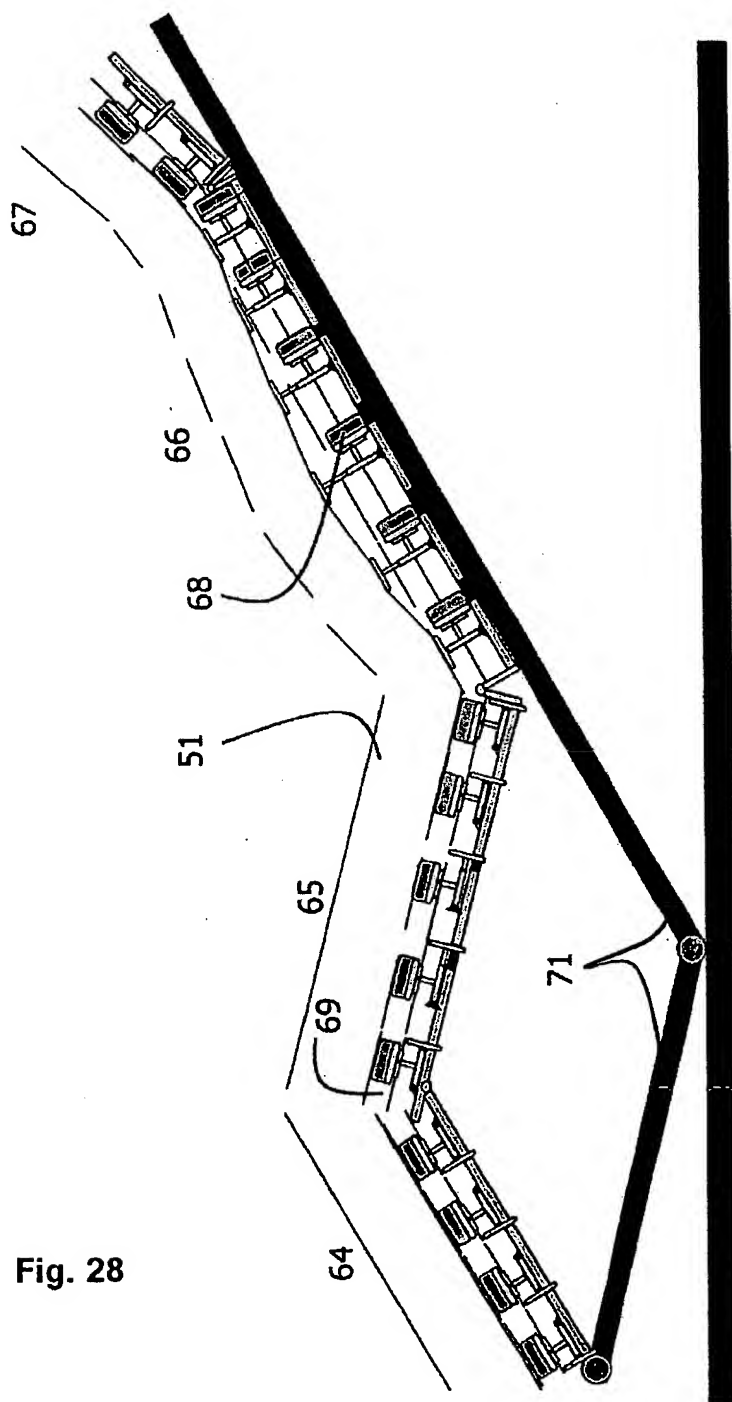


Fig. 28

10/508986

29/88

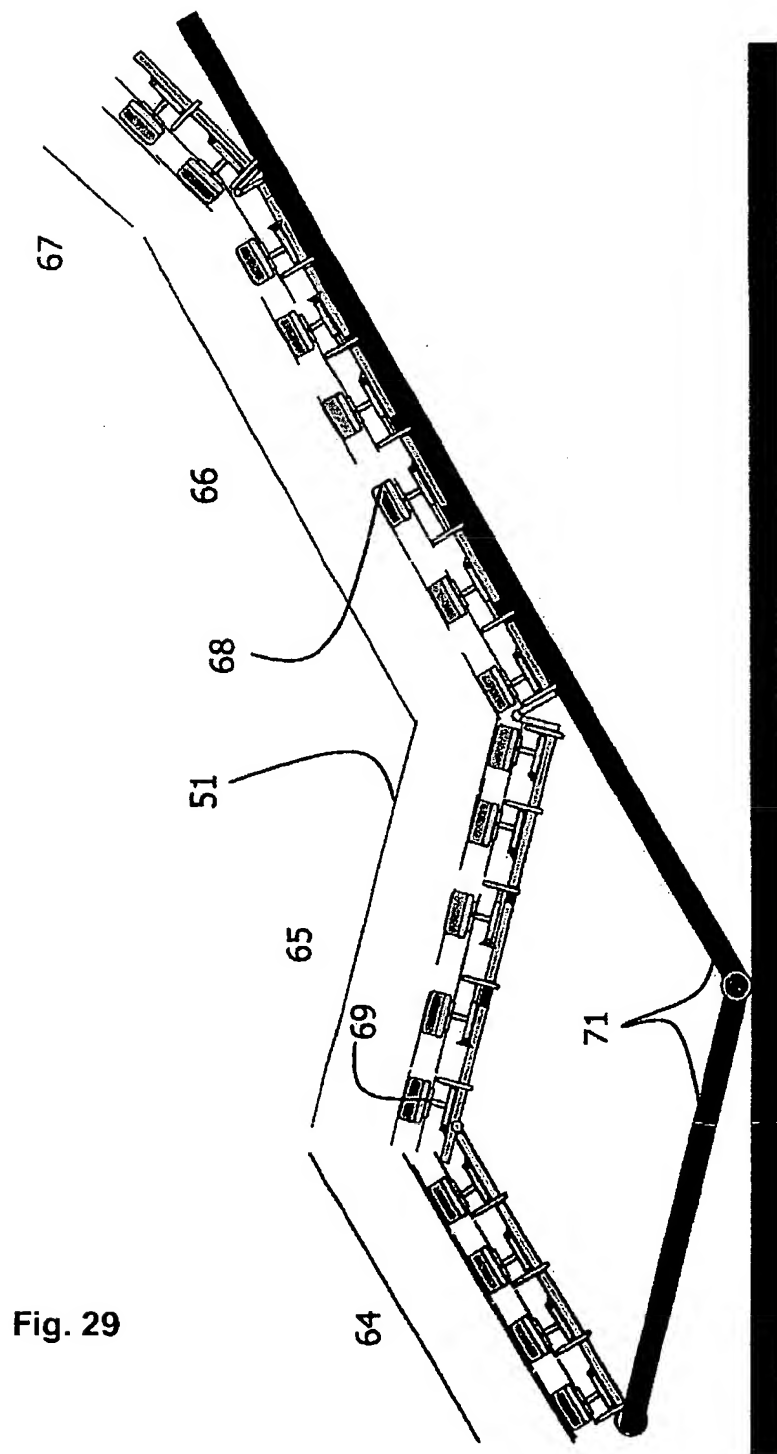


Fig. 29

10/508986

30/88

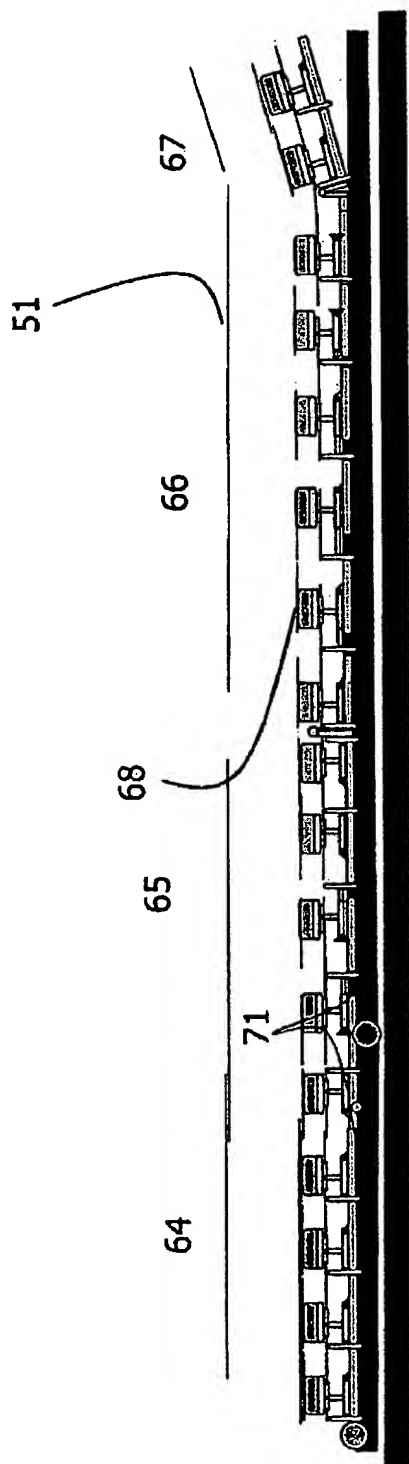
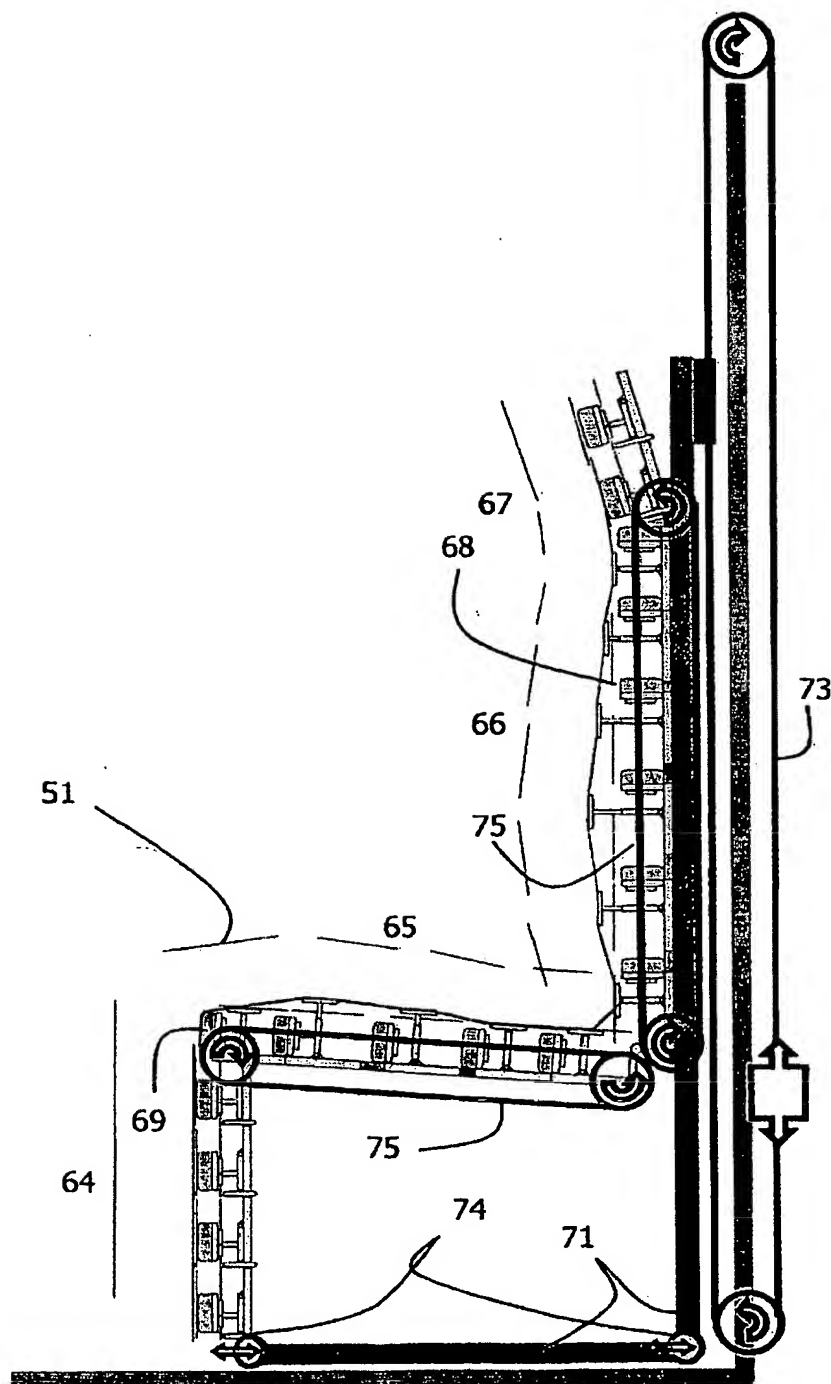


Fig. 30

Fig. 31



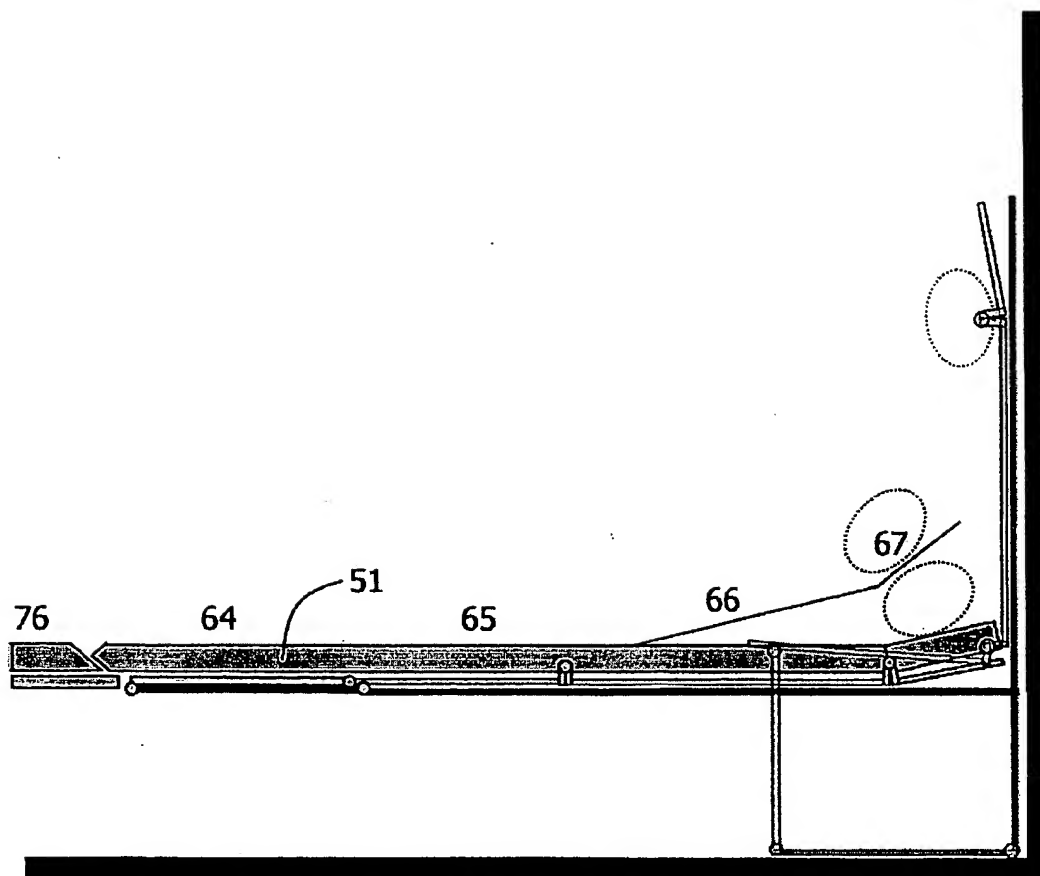


Fig. 32

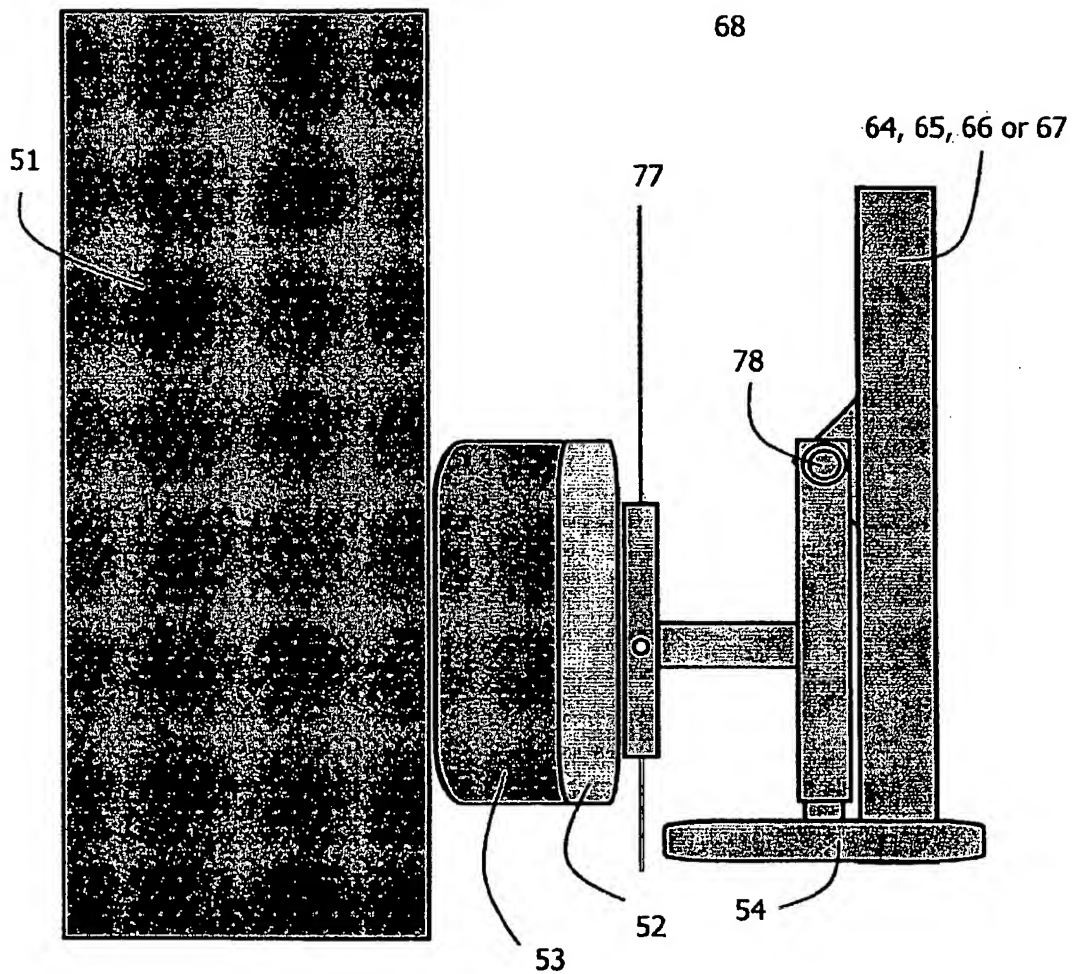


Fig. 33

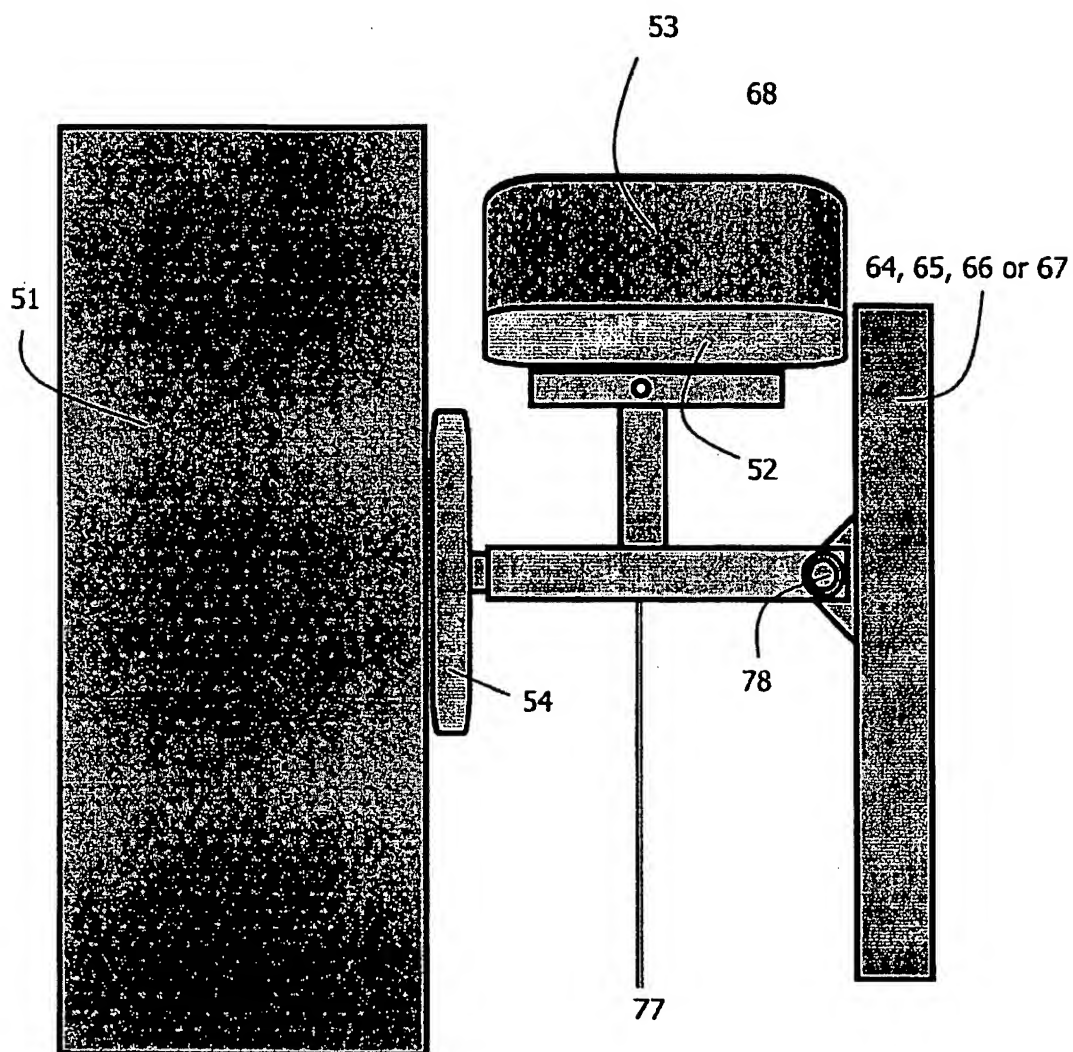


Fig. 34

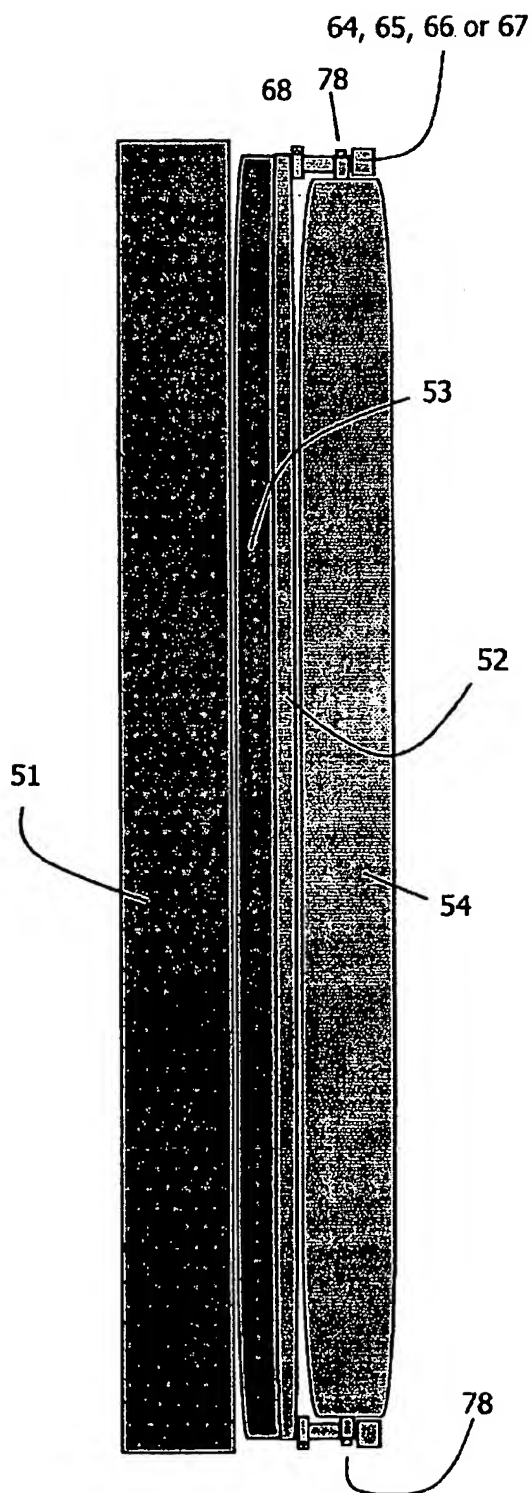


Fig. 35

10/508986

36 / 88

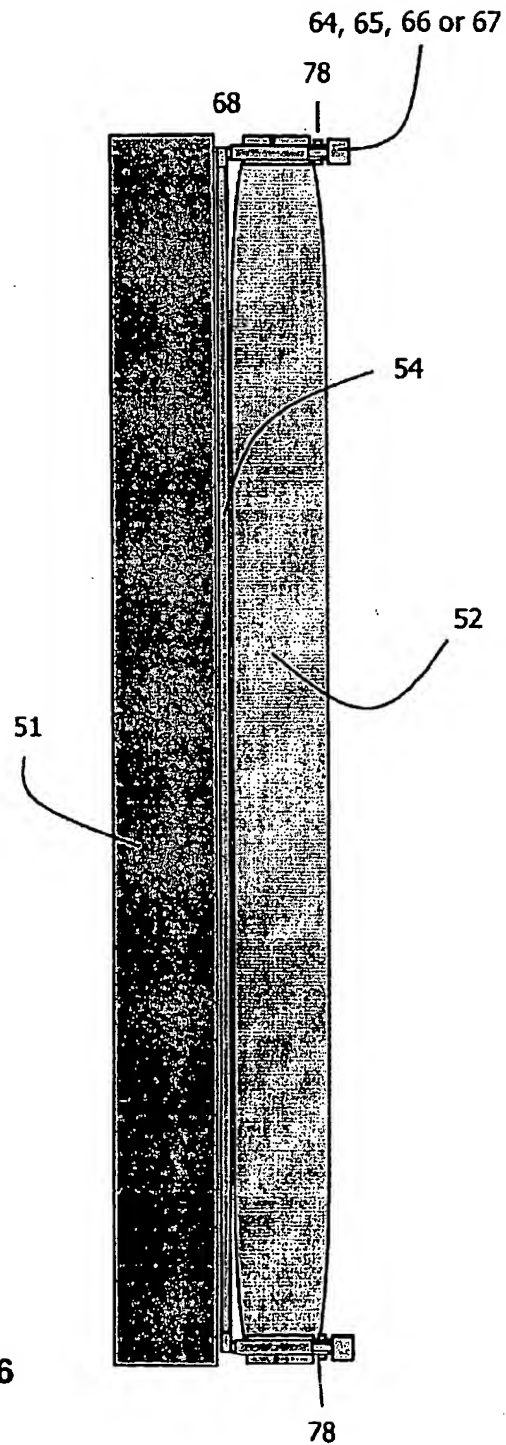


Fig. 36

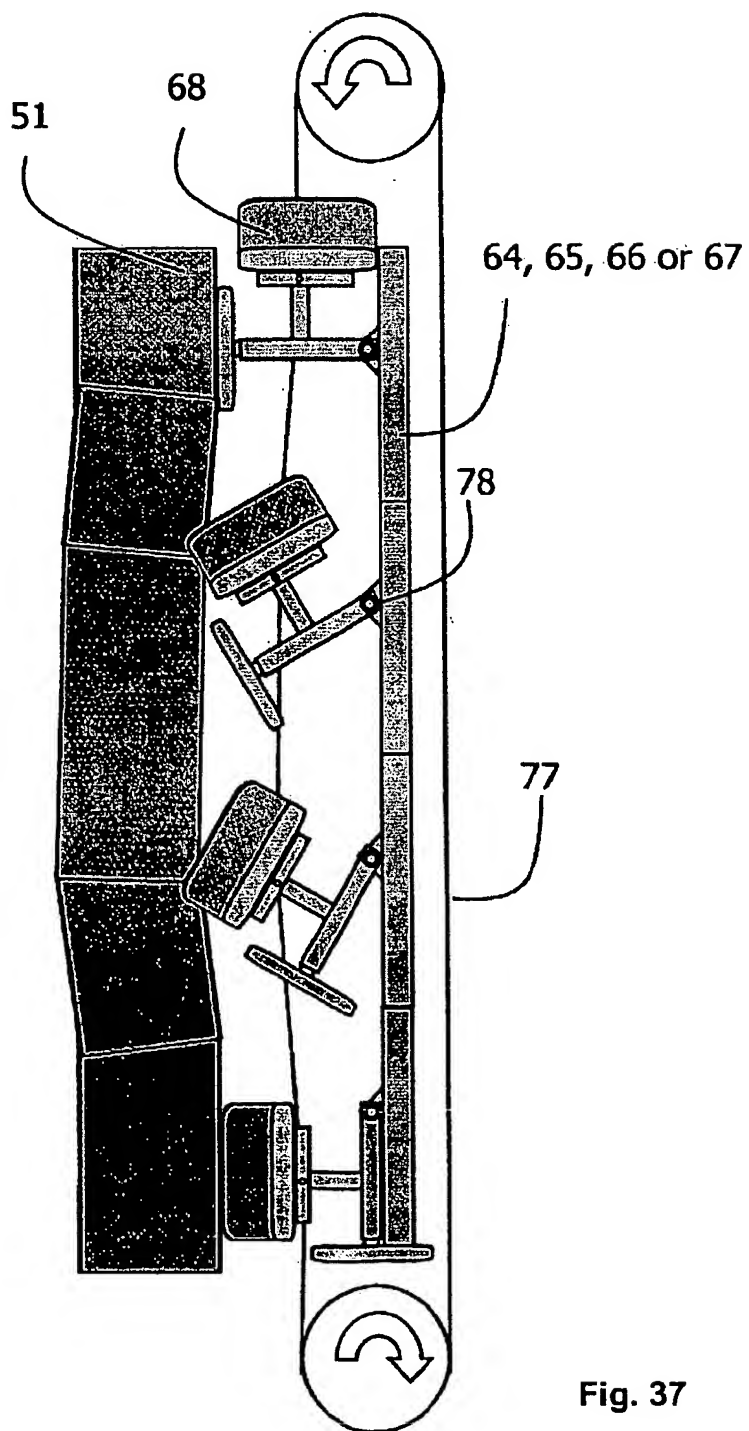


Fig. 37

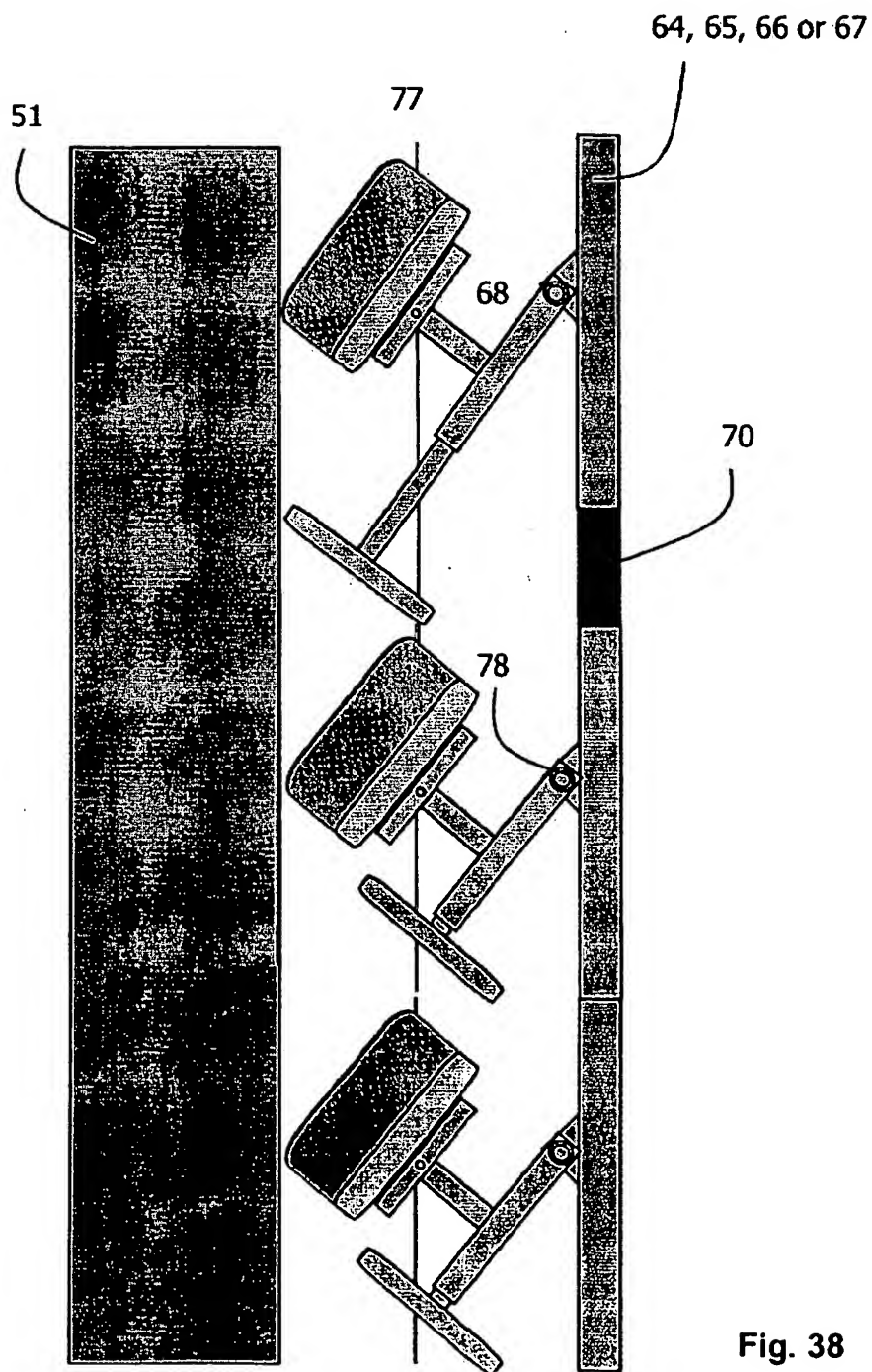


Fig. 38

10/508986

39 / 88

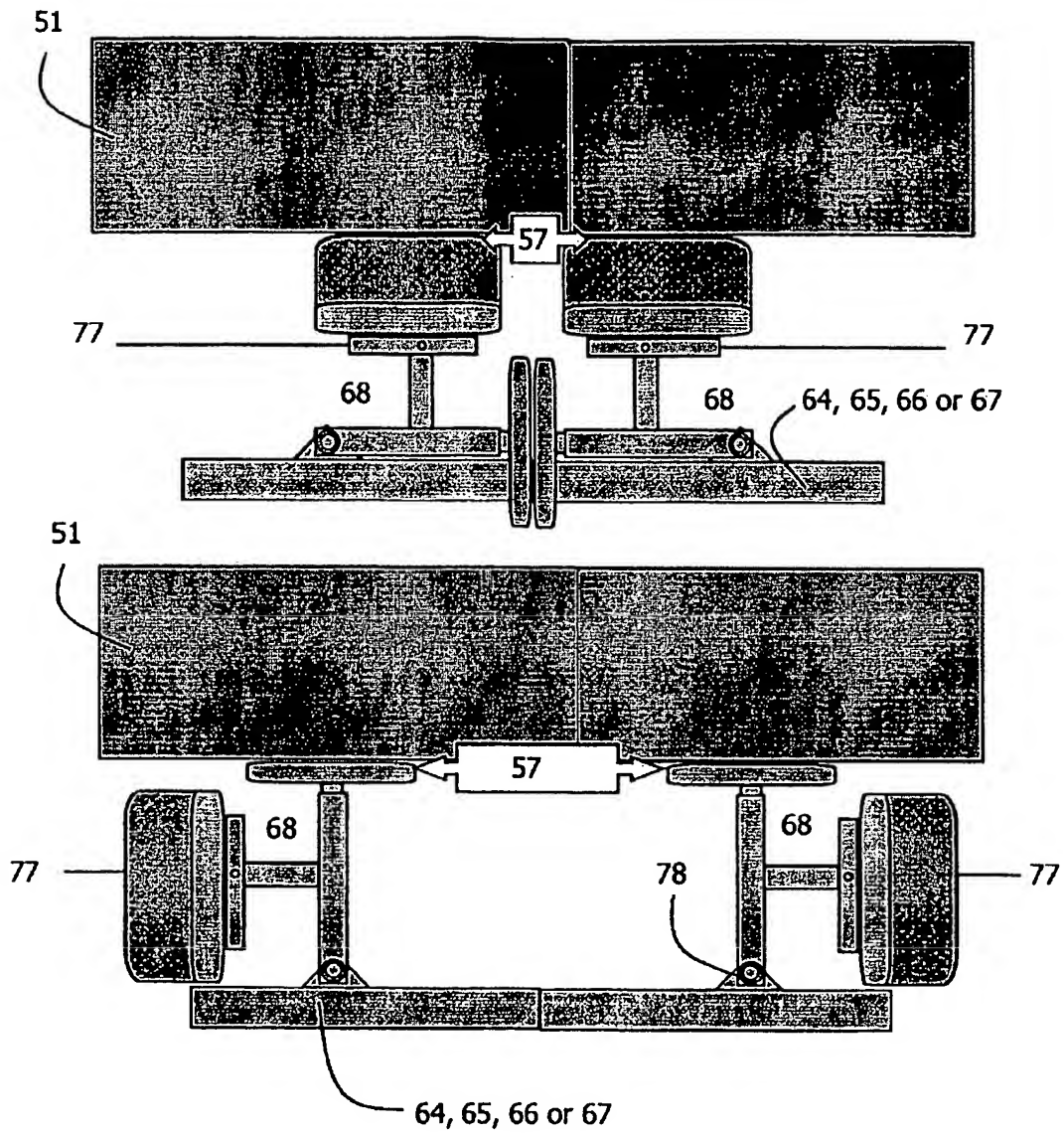


Fig. 39

10/508986

40 / 88

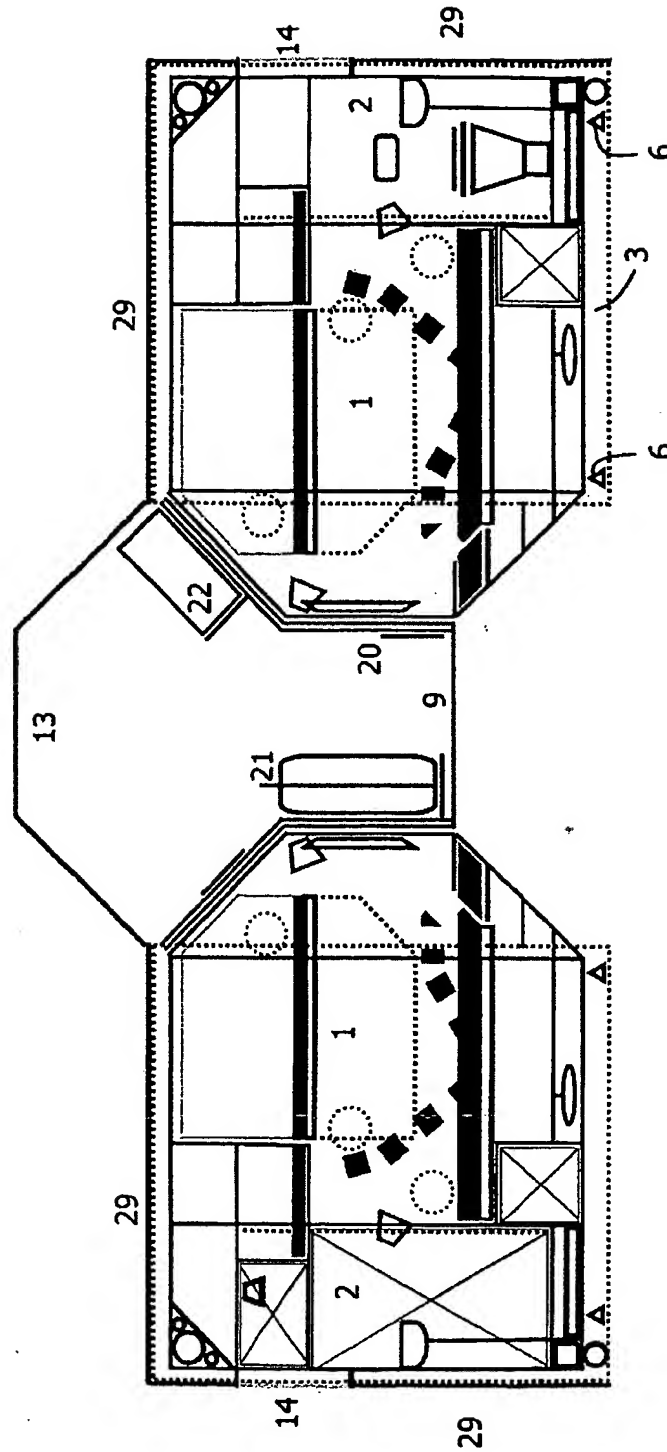


Fig. 40

41 / 88

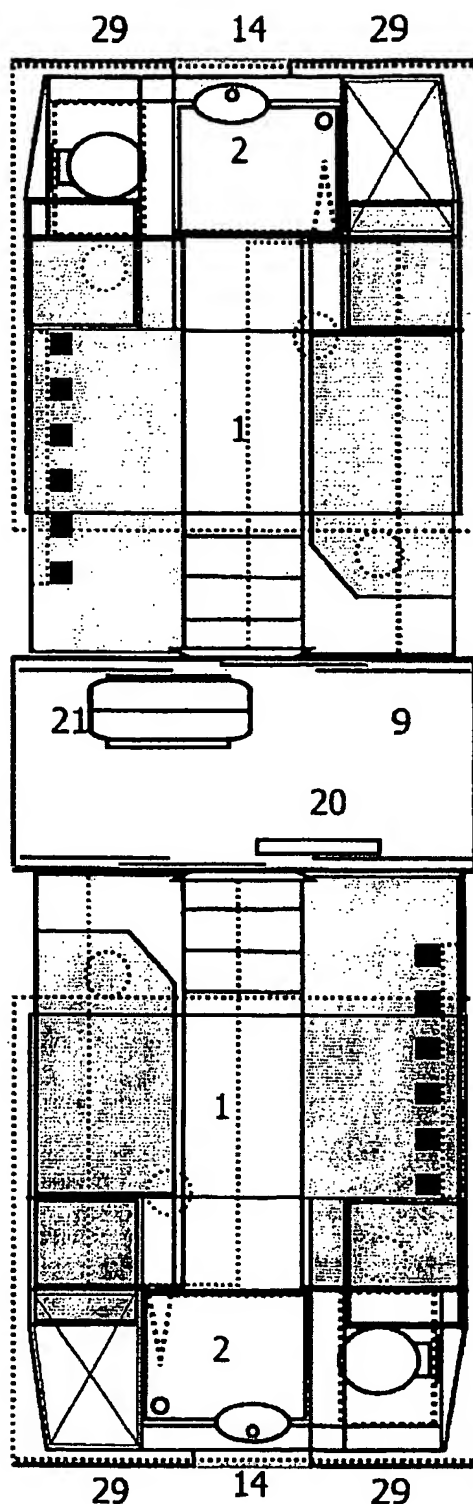


Fig. 41

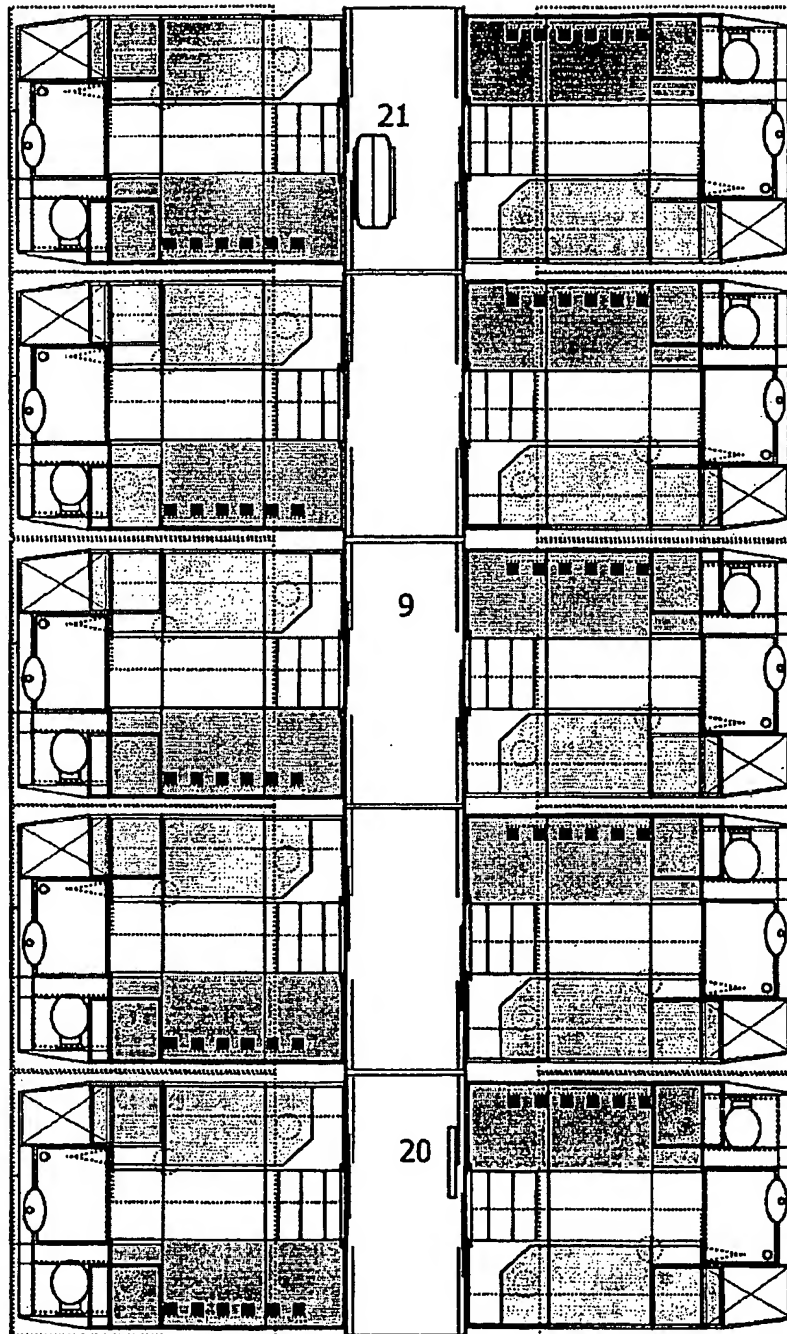


Fig. 42

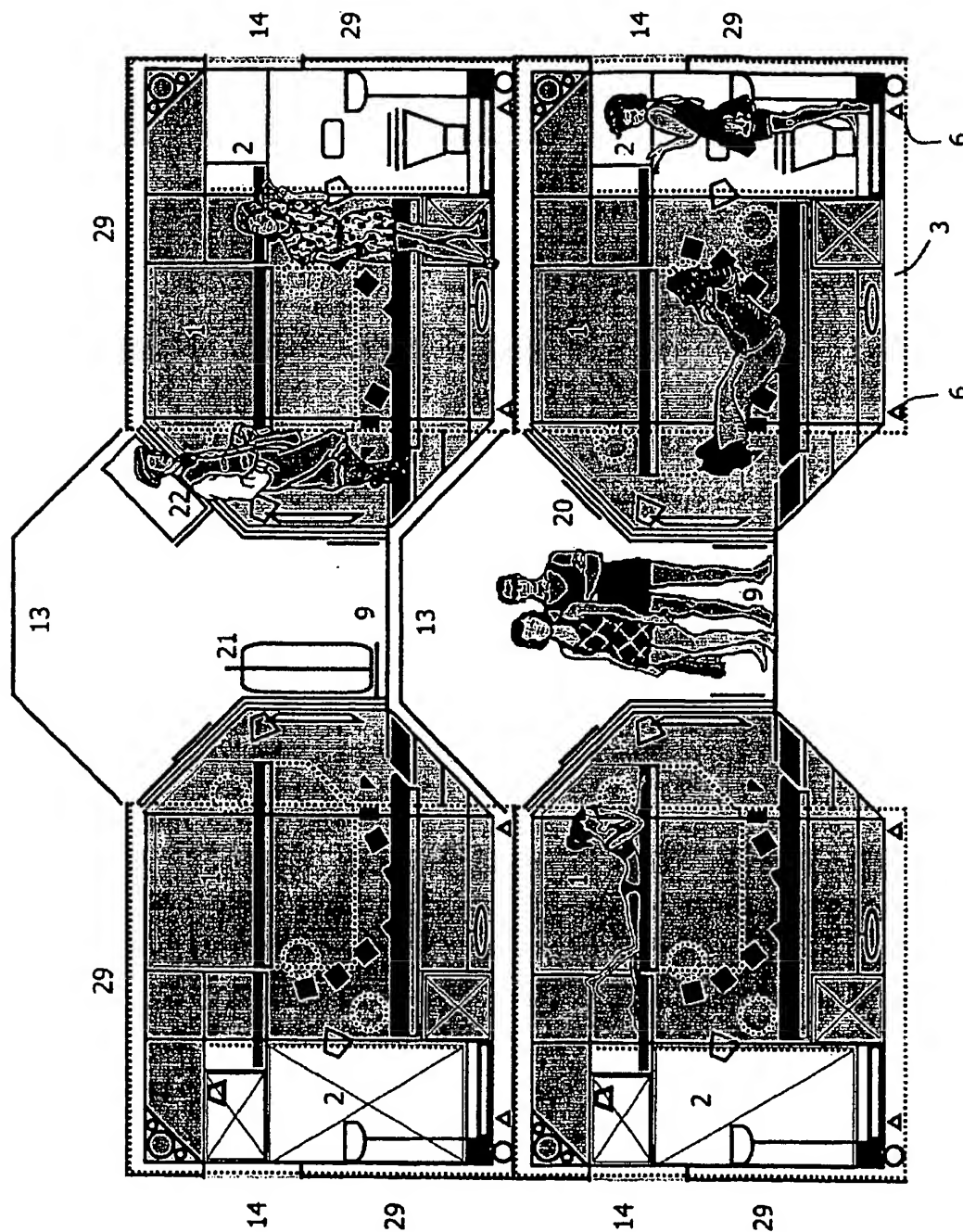


Fig. 43

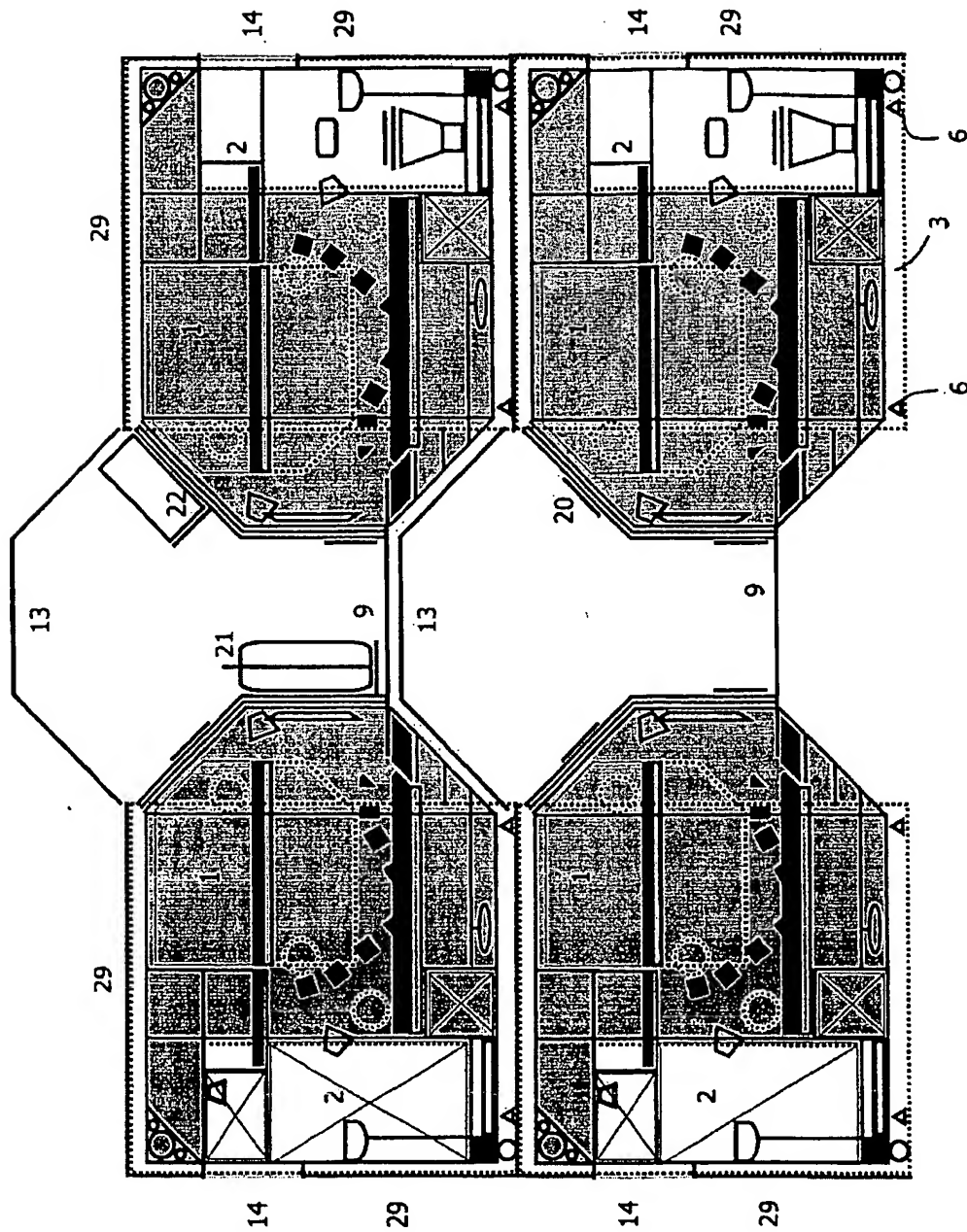


Fig. 44

10/508986

45 / 88

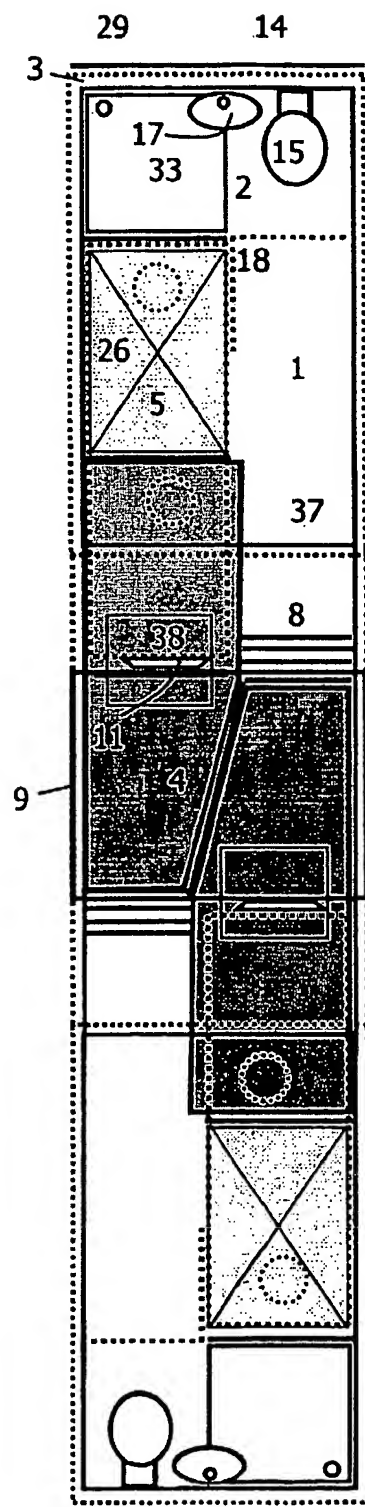


Fig. 45

10/508986

46 / 88

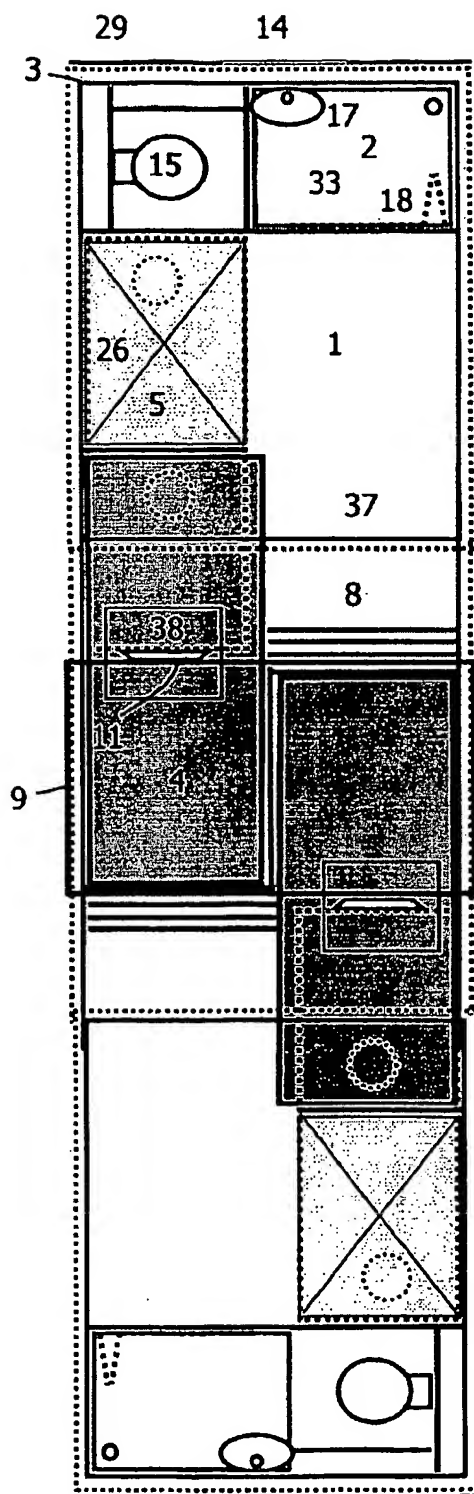


Fig. 46

10/508986

47 / 88

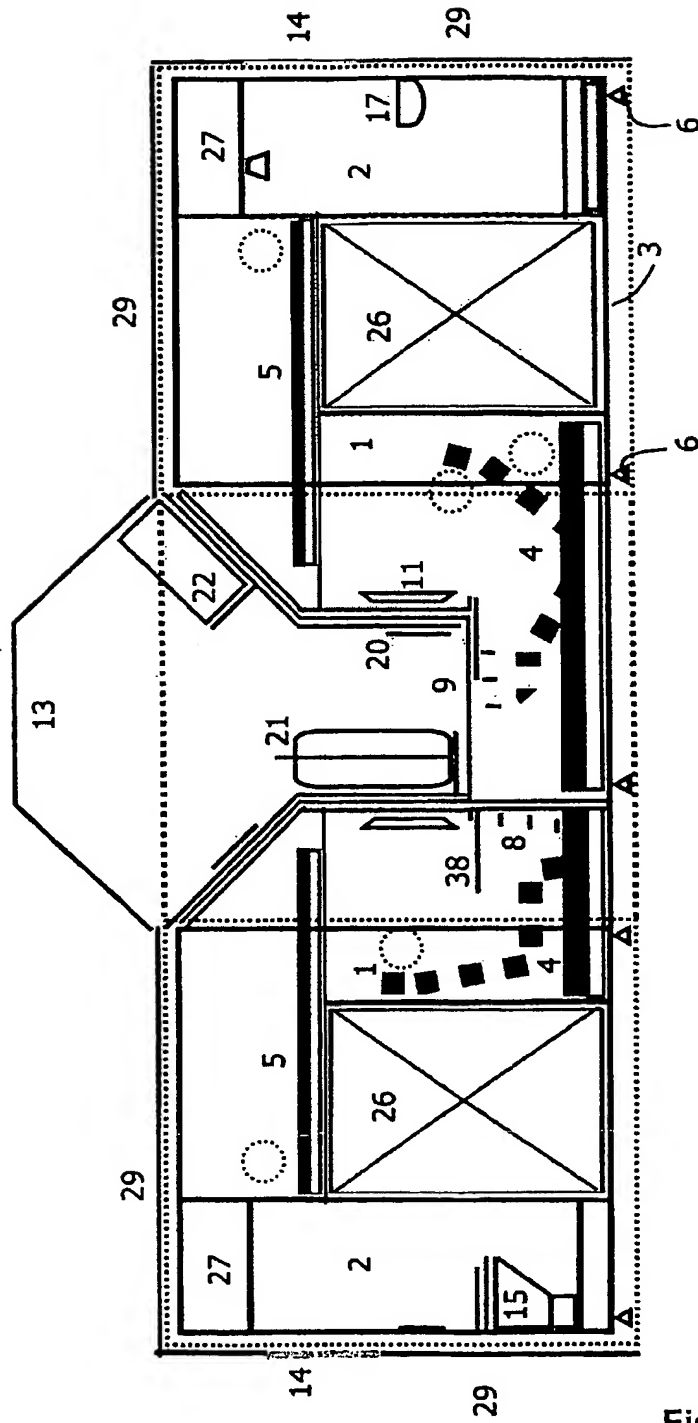


Fig. 47

10/508986

48 / 88

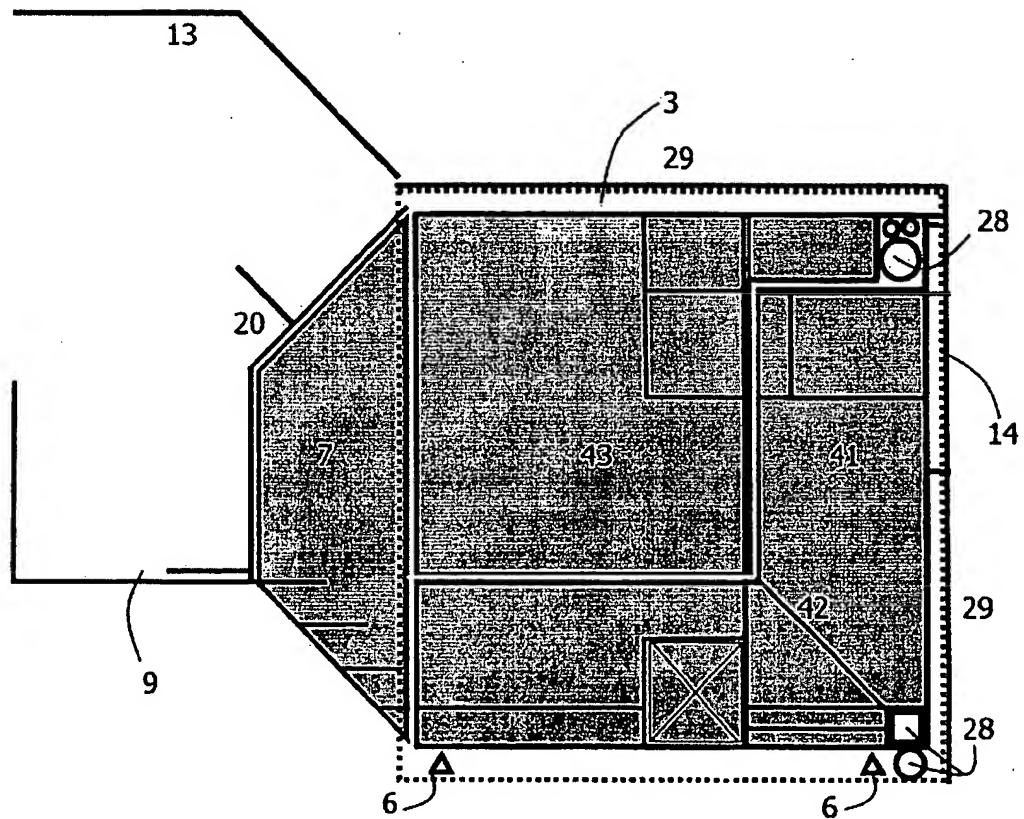


Fig. 48

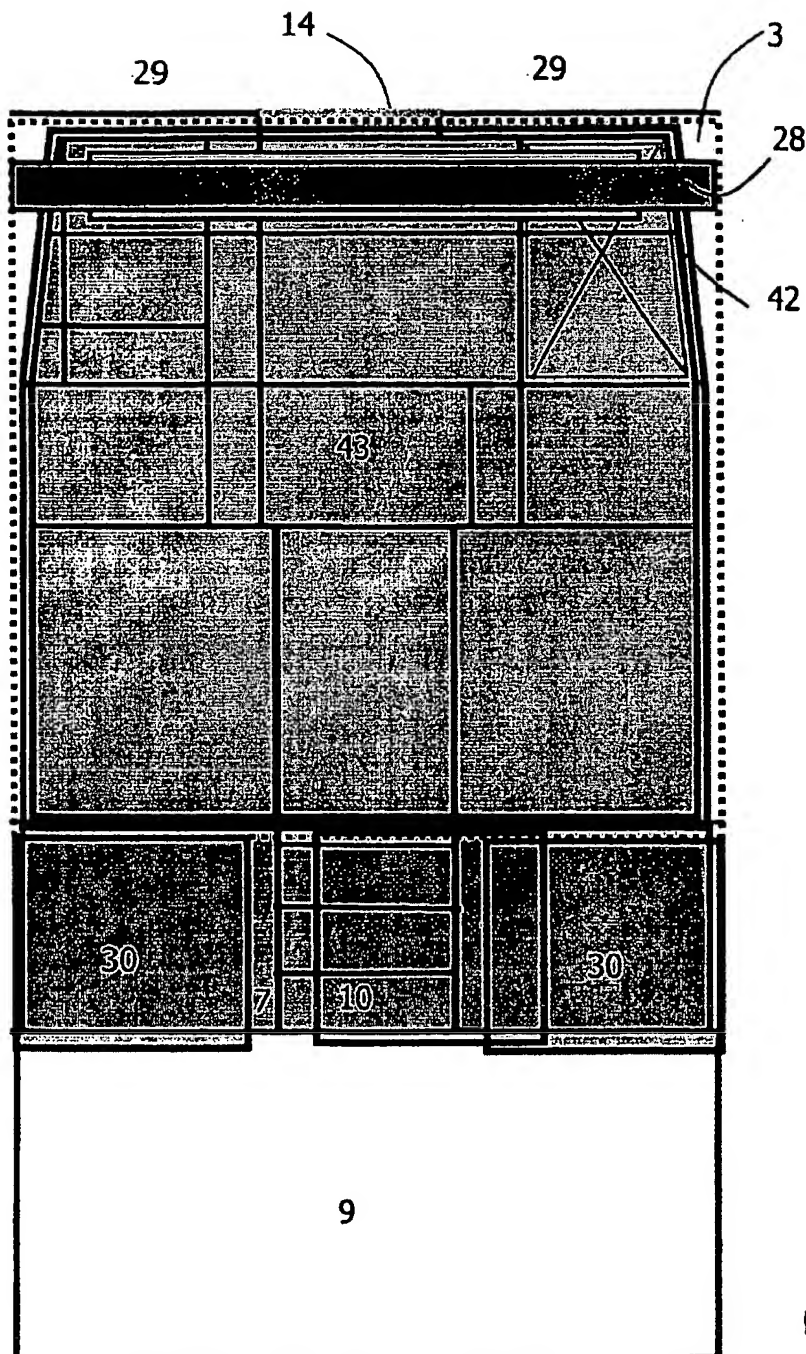


Fig. 49

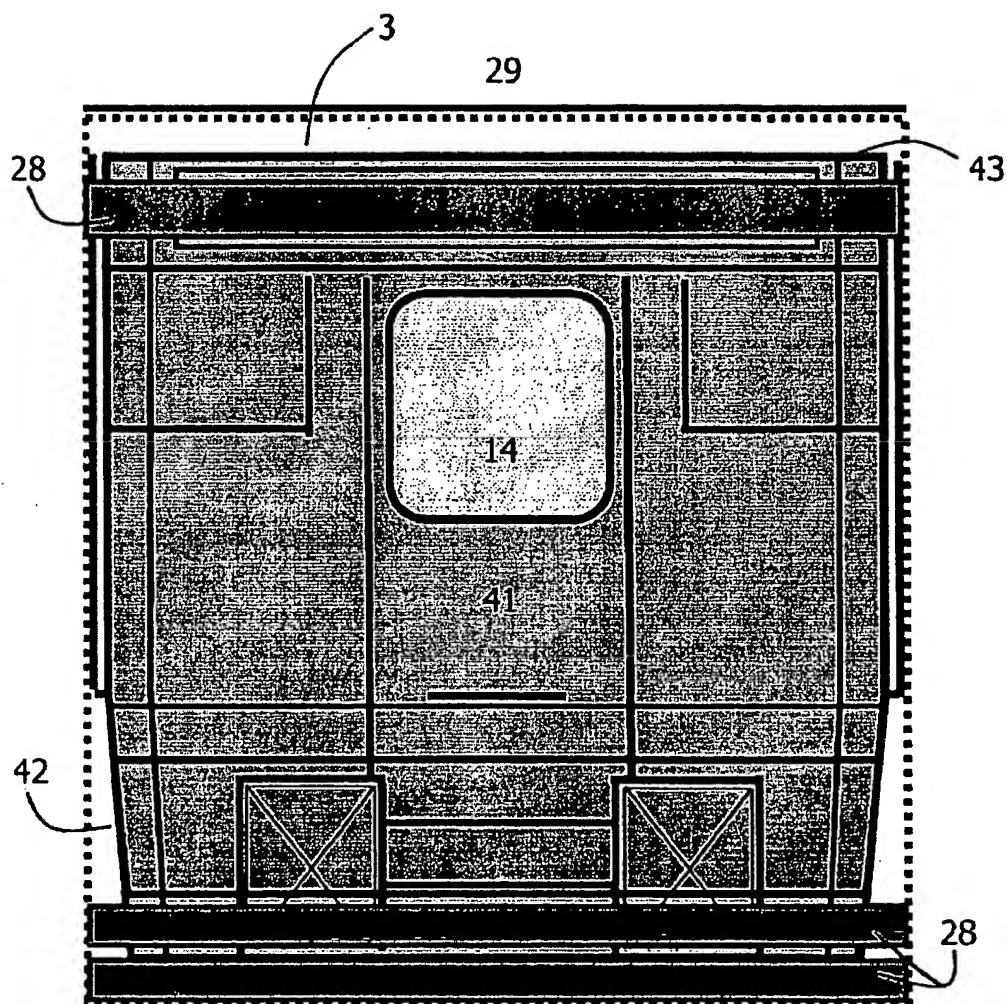


Fig. 50

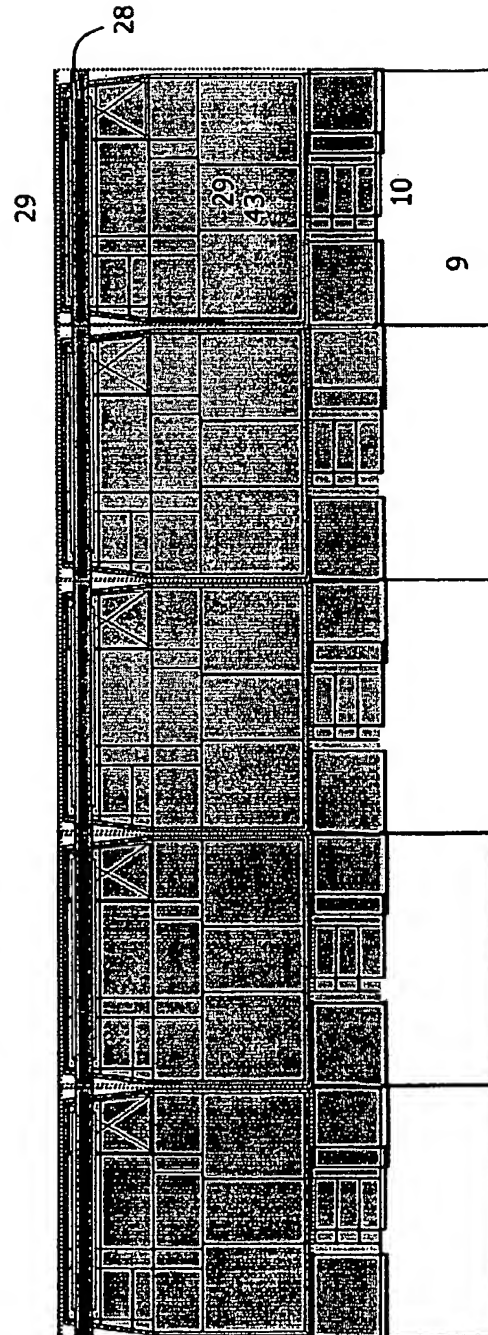


Fig. 51

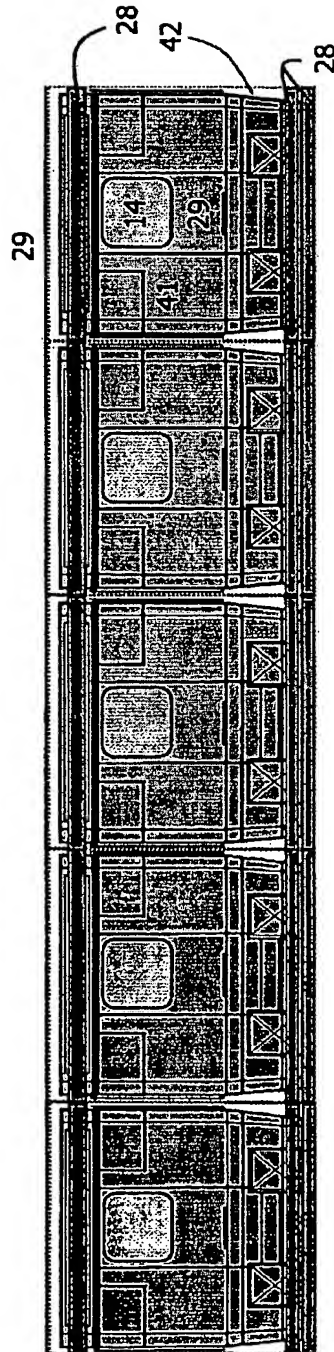


Fig. 52

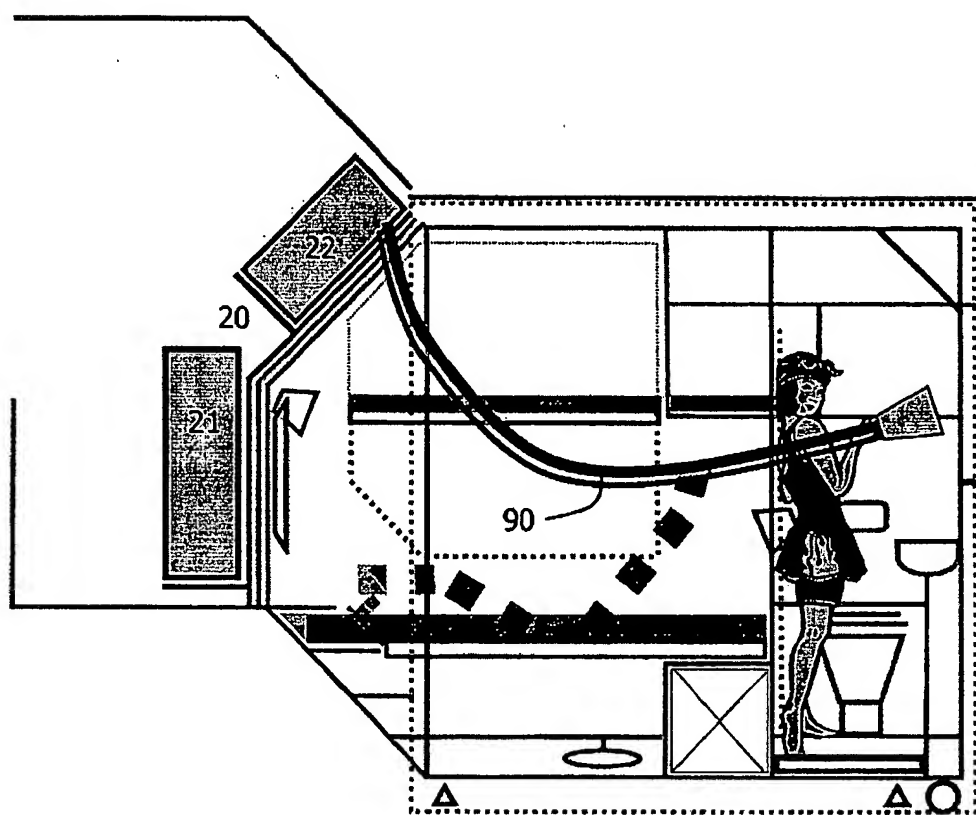


Fig. 53

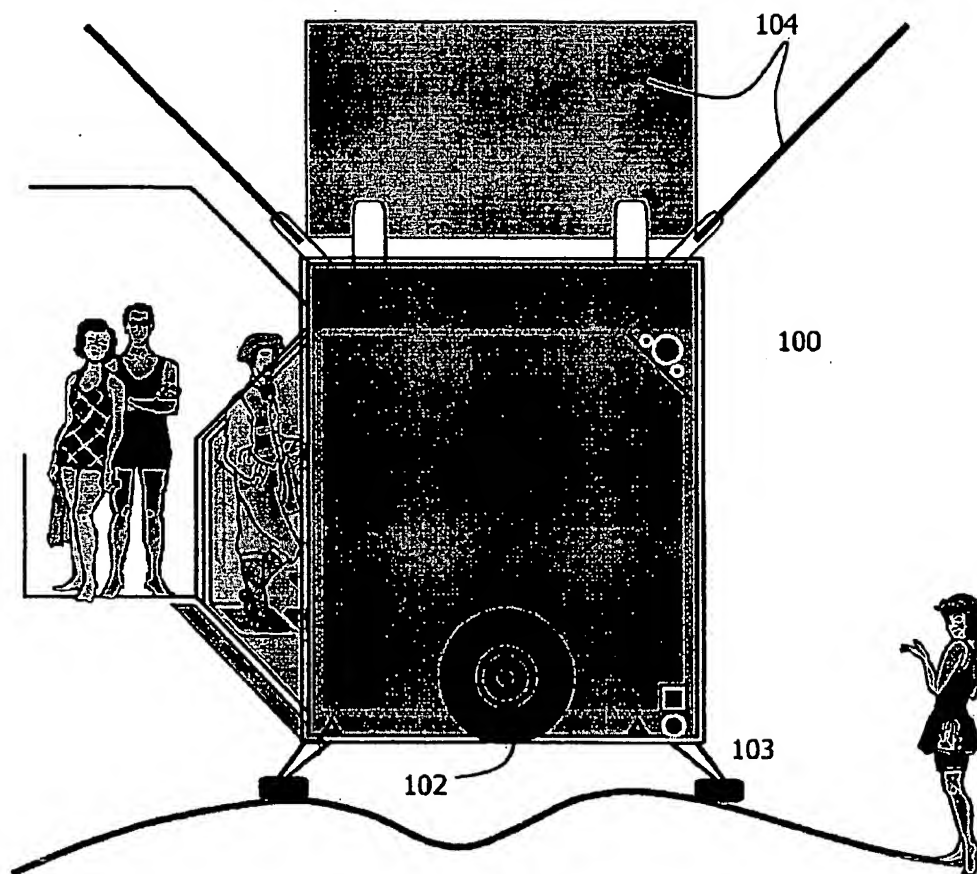


Fig. 54

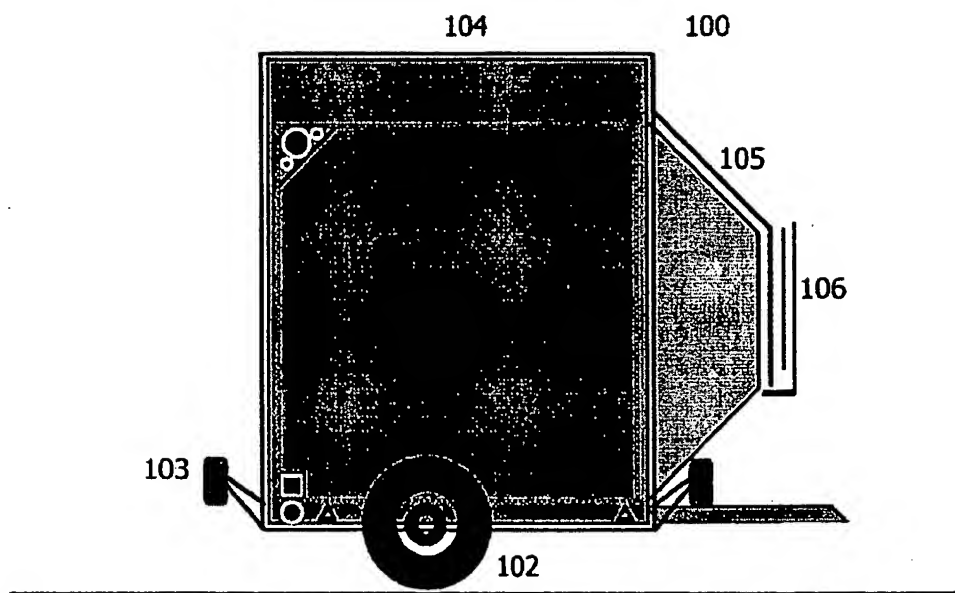


Fig. 55

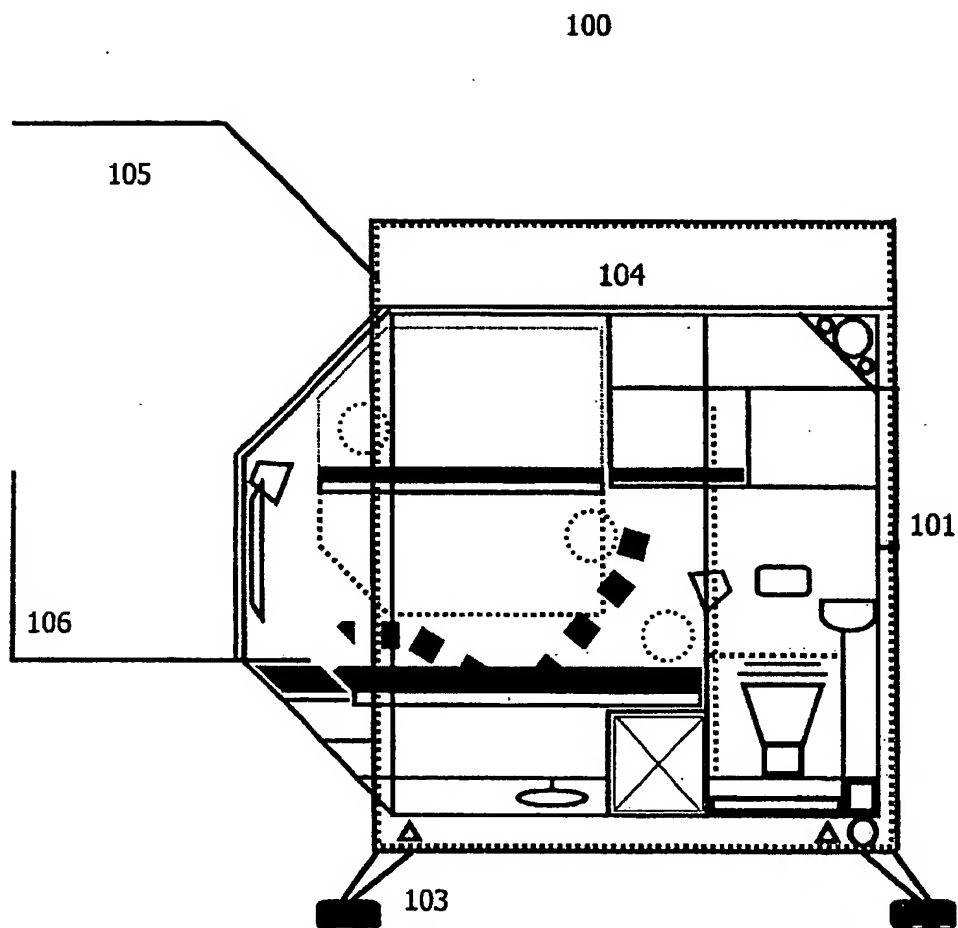


Fig. 56

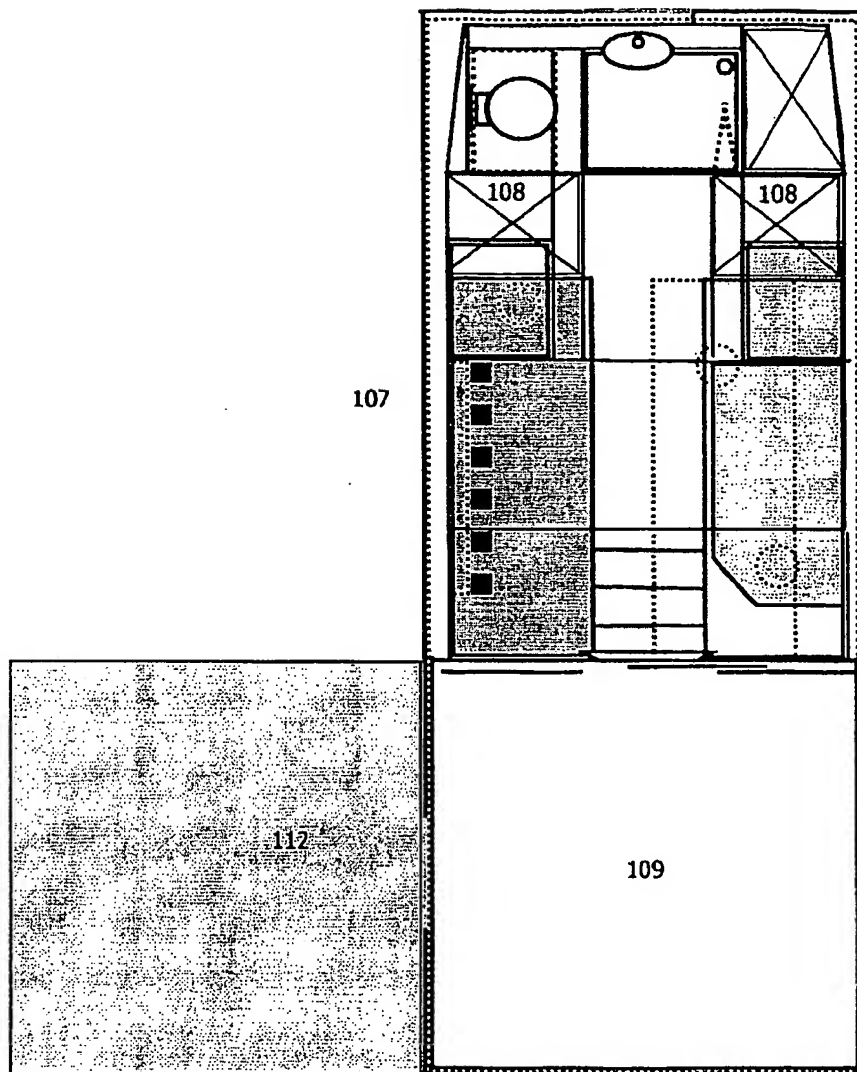


Fig. 57

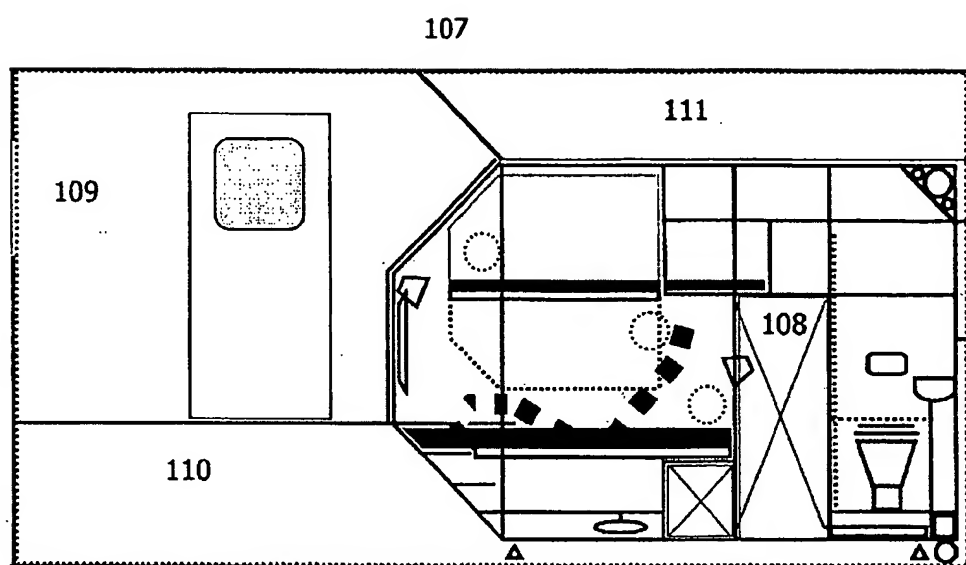


Fig. 58

10/508986

59 / 88

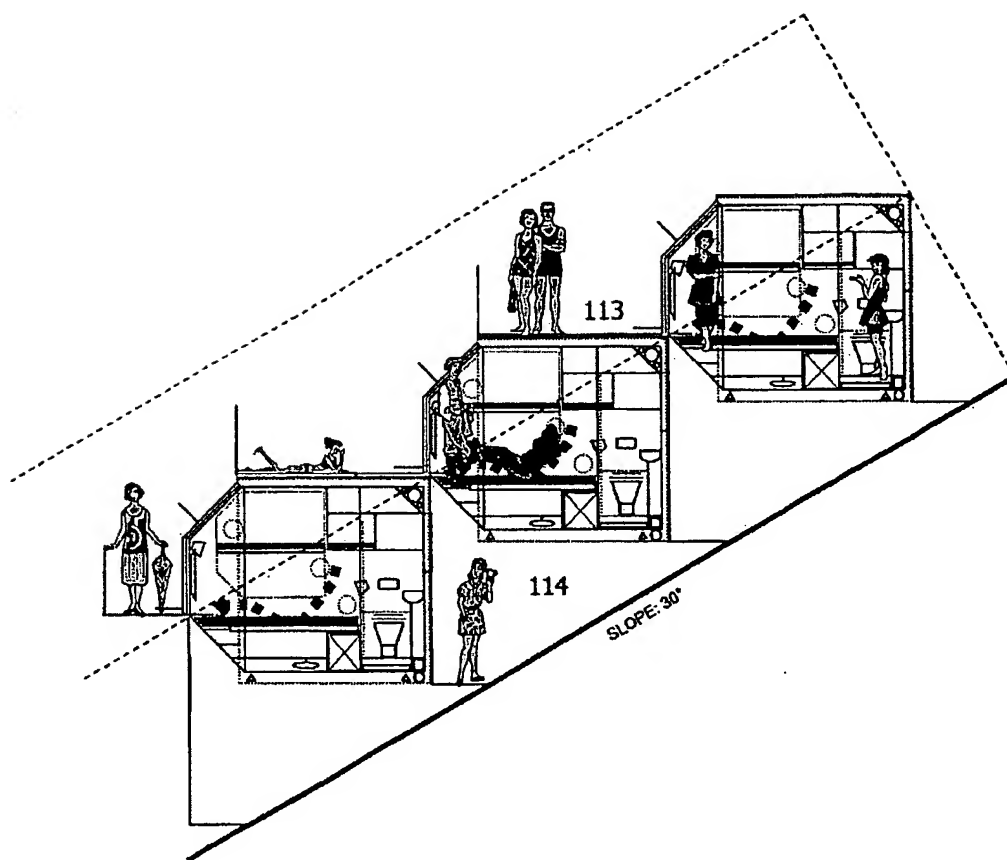


Fig. 59

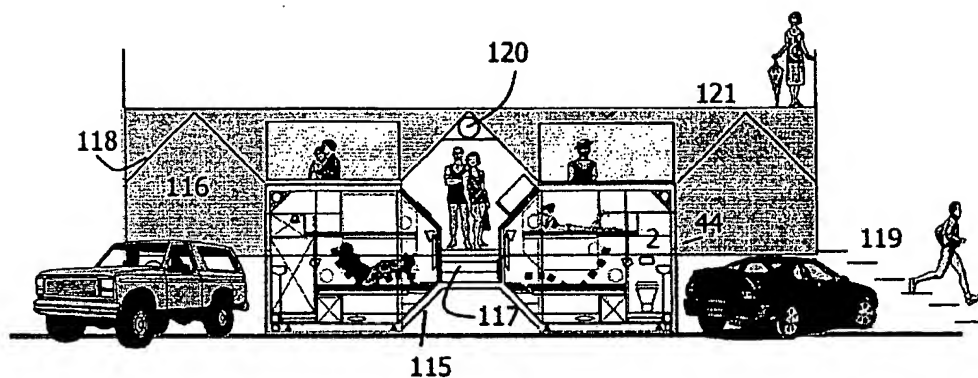
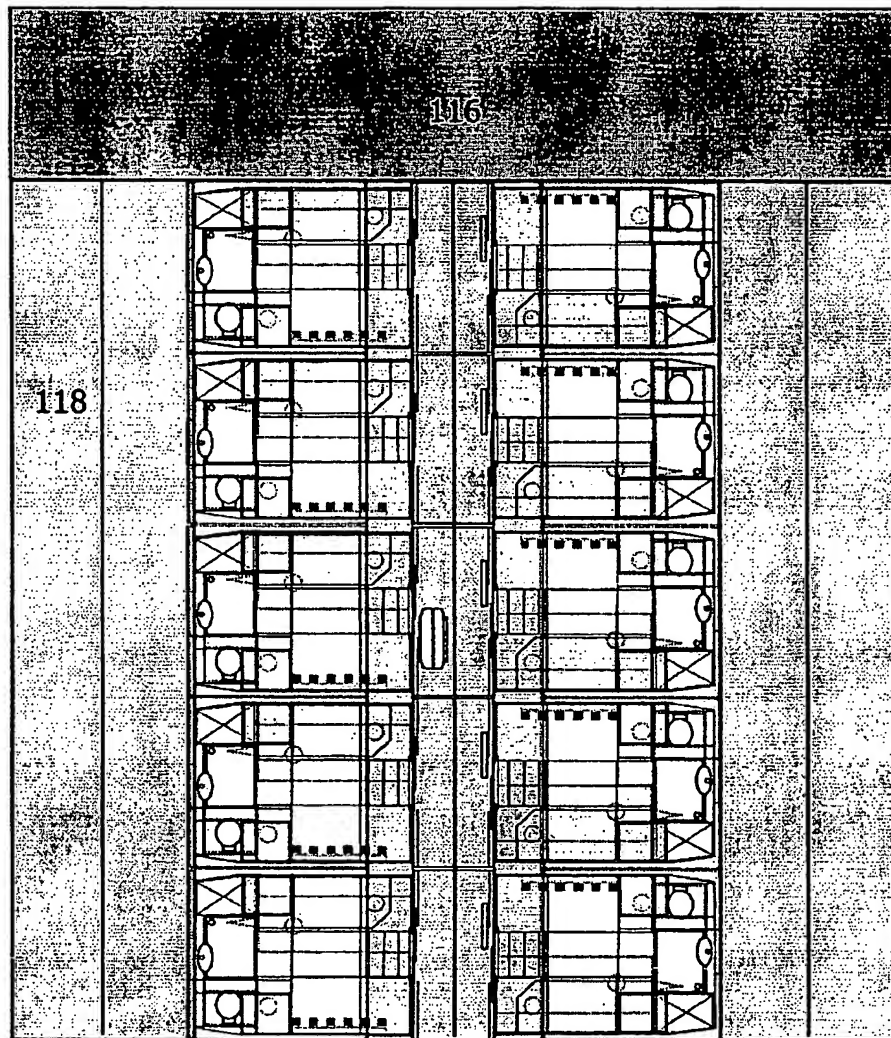


Fig. 60



115

Fig. 61

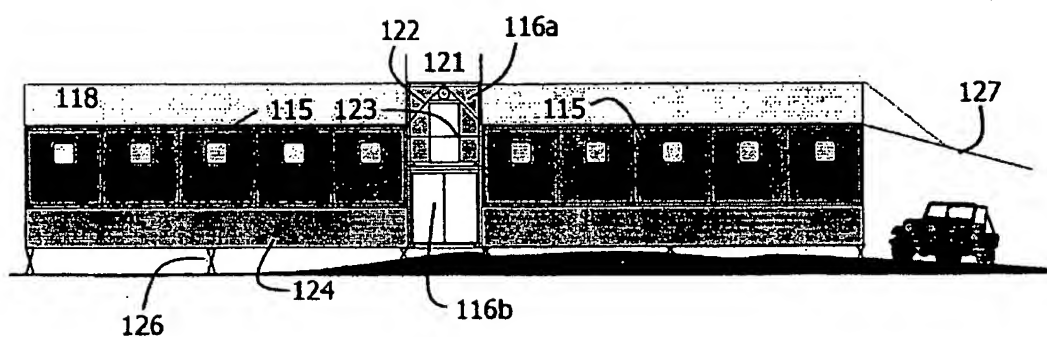


Fig. 62

10/508986

63 / 88

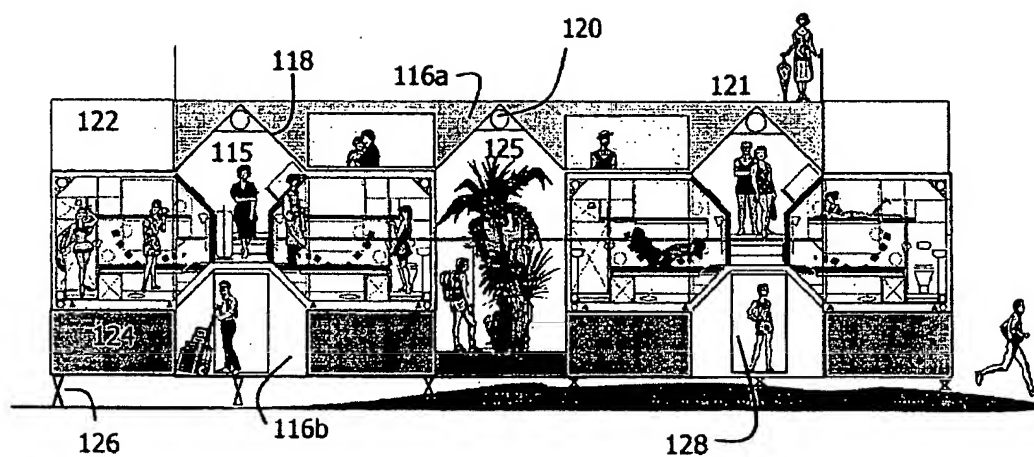


Fig. 63

10/508986

64 / 88

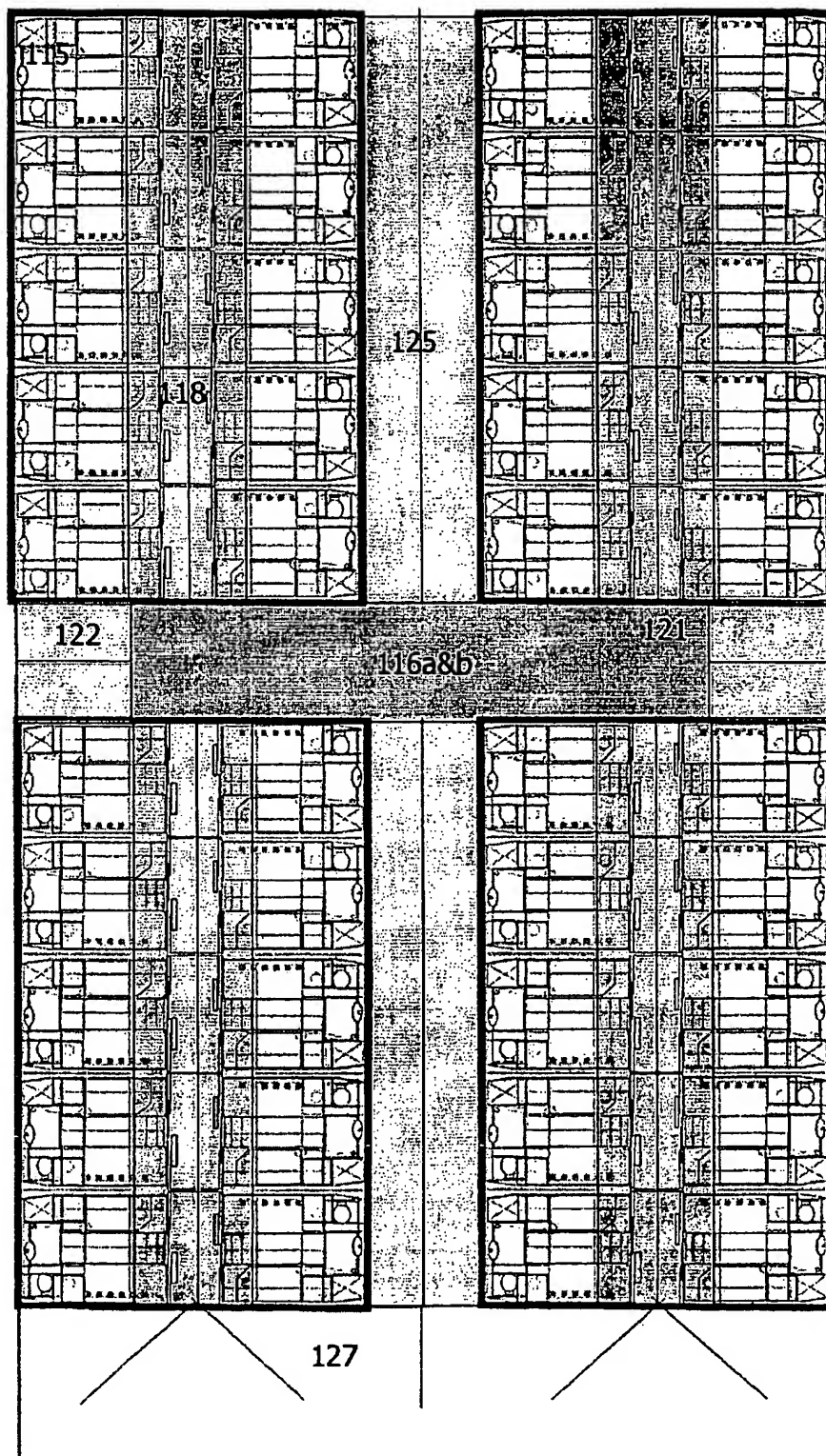


Fig. 64

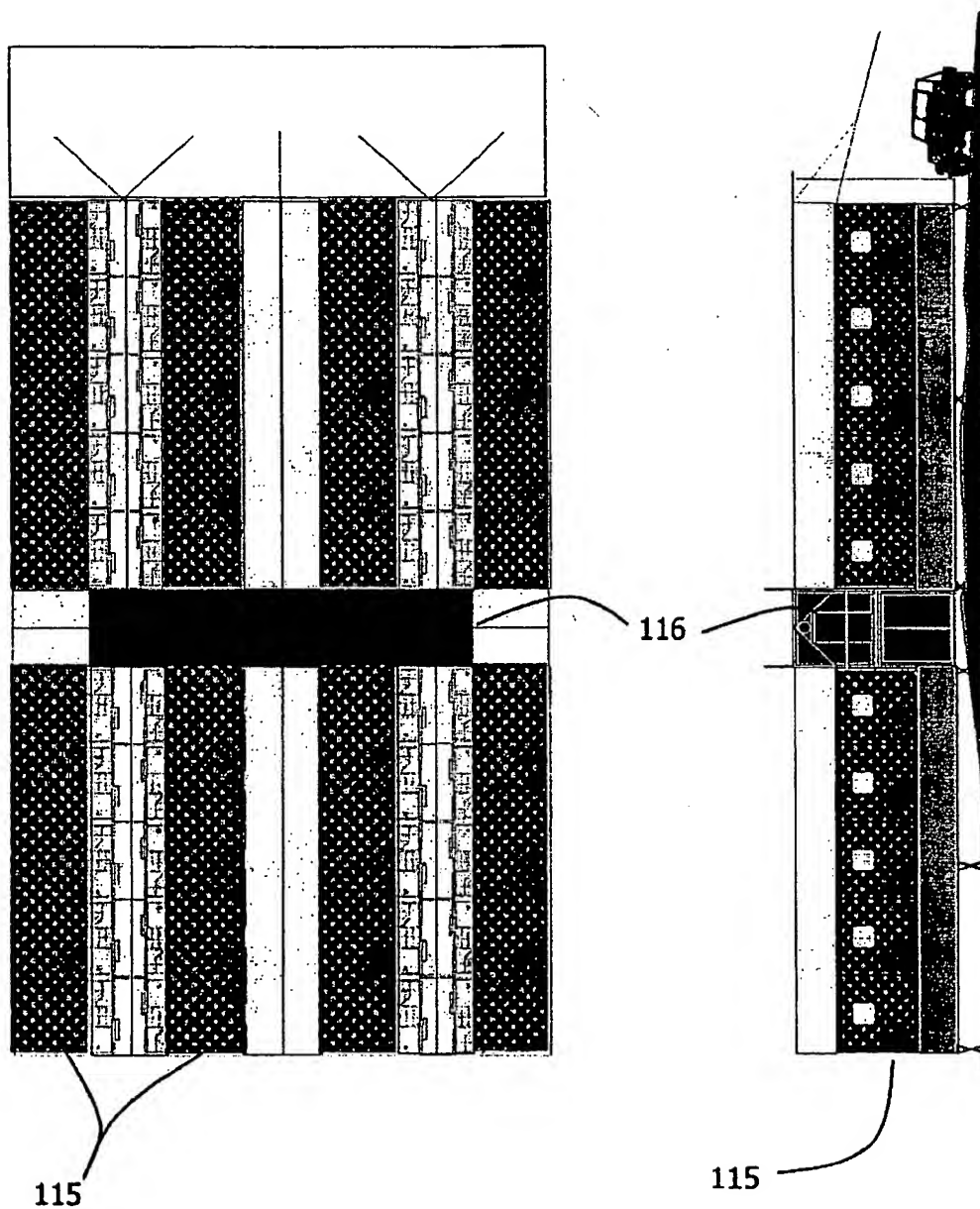


Fig. 65

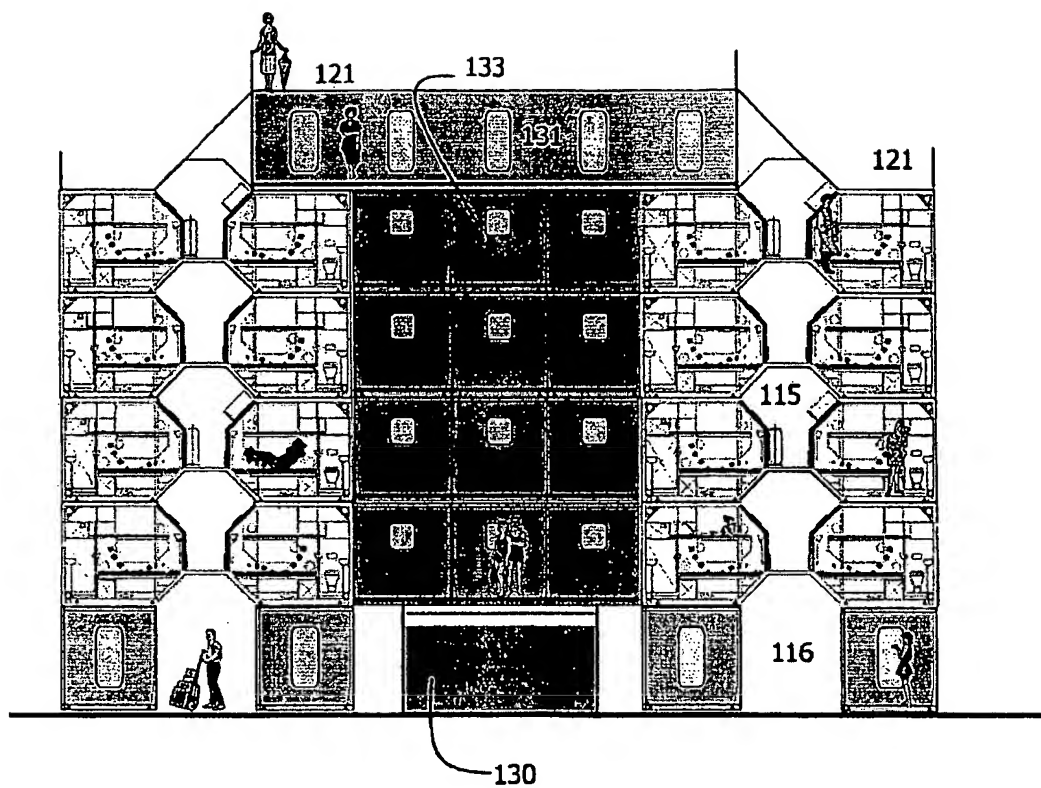


Fig. 66

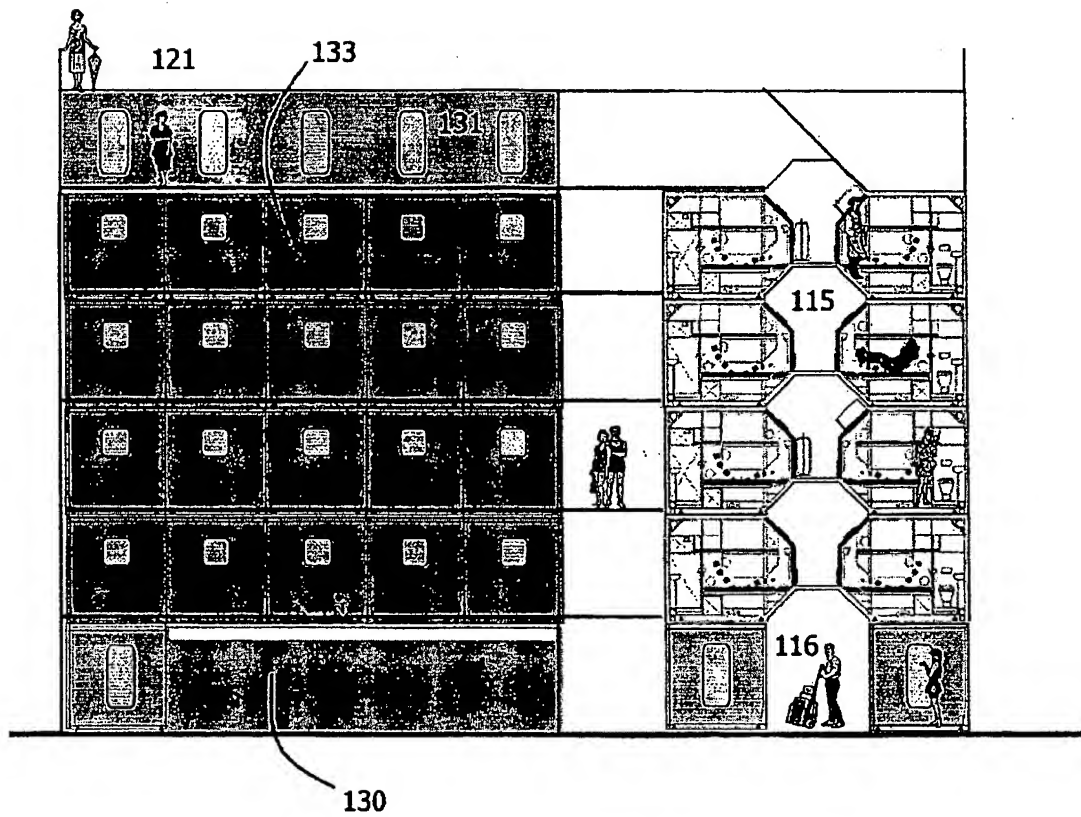


Fig. 67

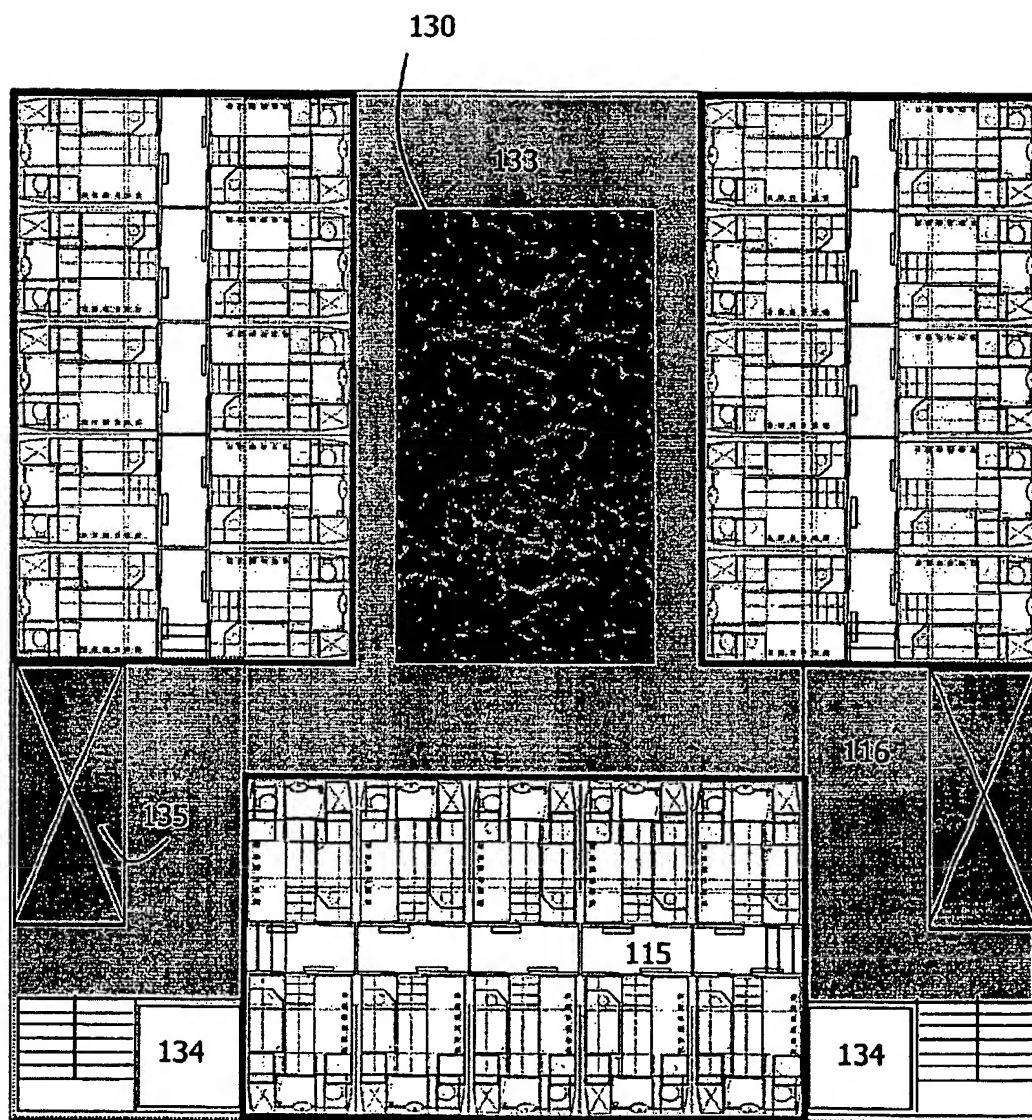


Fig. 68

10/508986

69 / 88

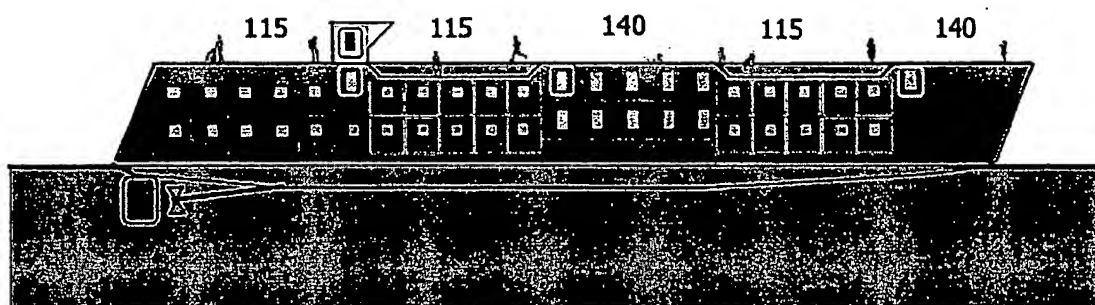


Fig. 69

10/508986

70 / 88

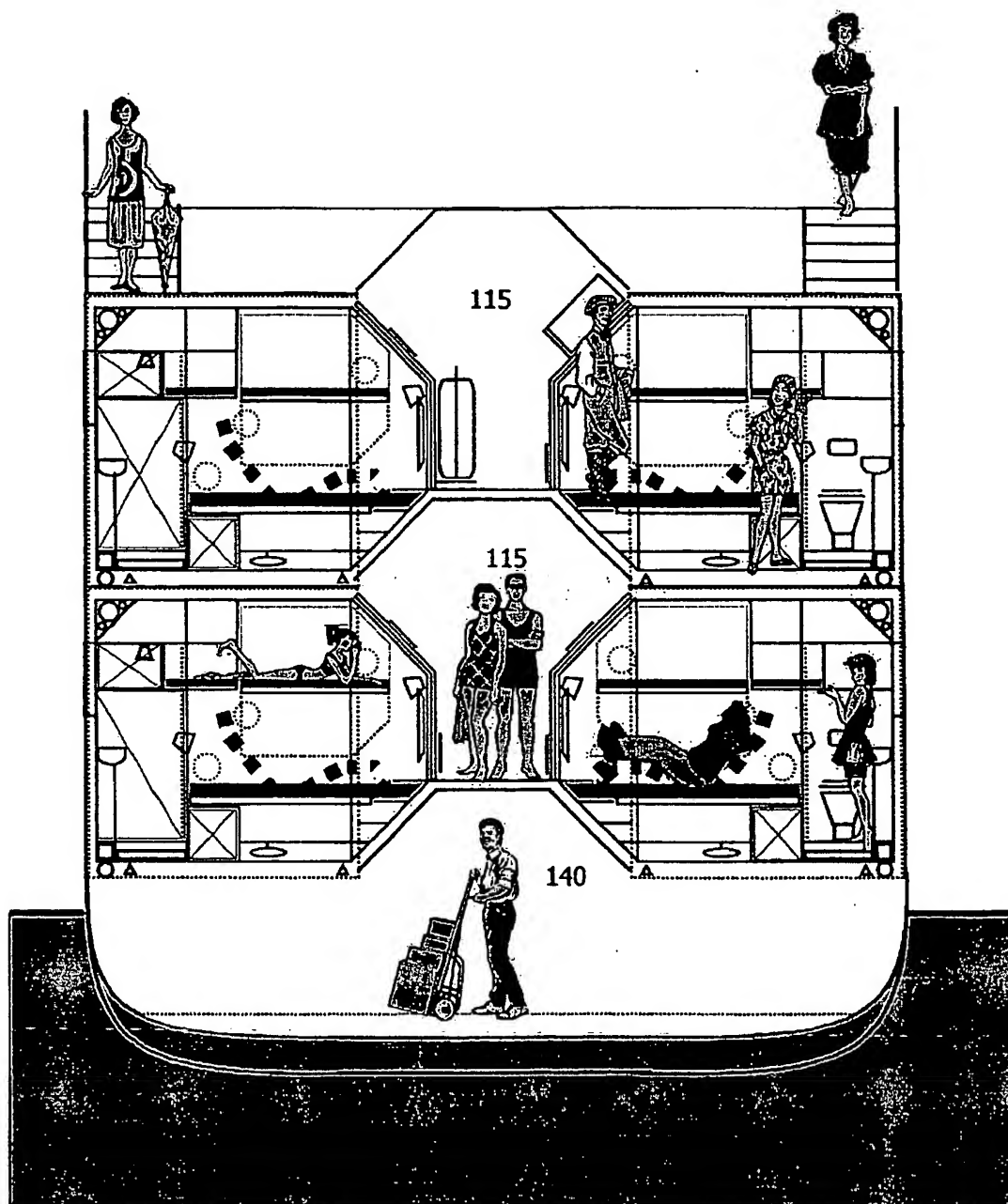


Fig. 70

10/508986

71 / 88

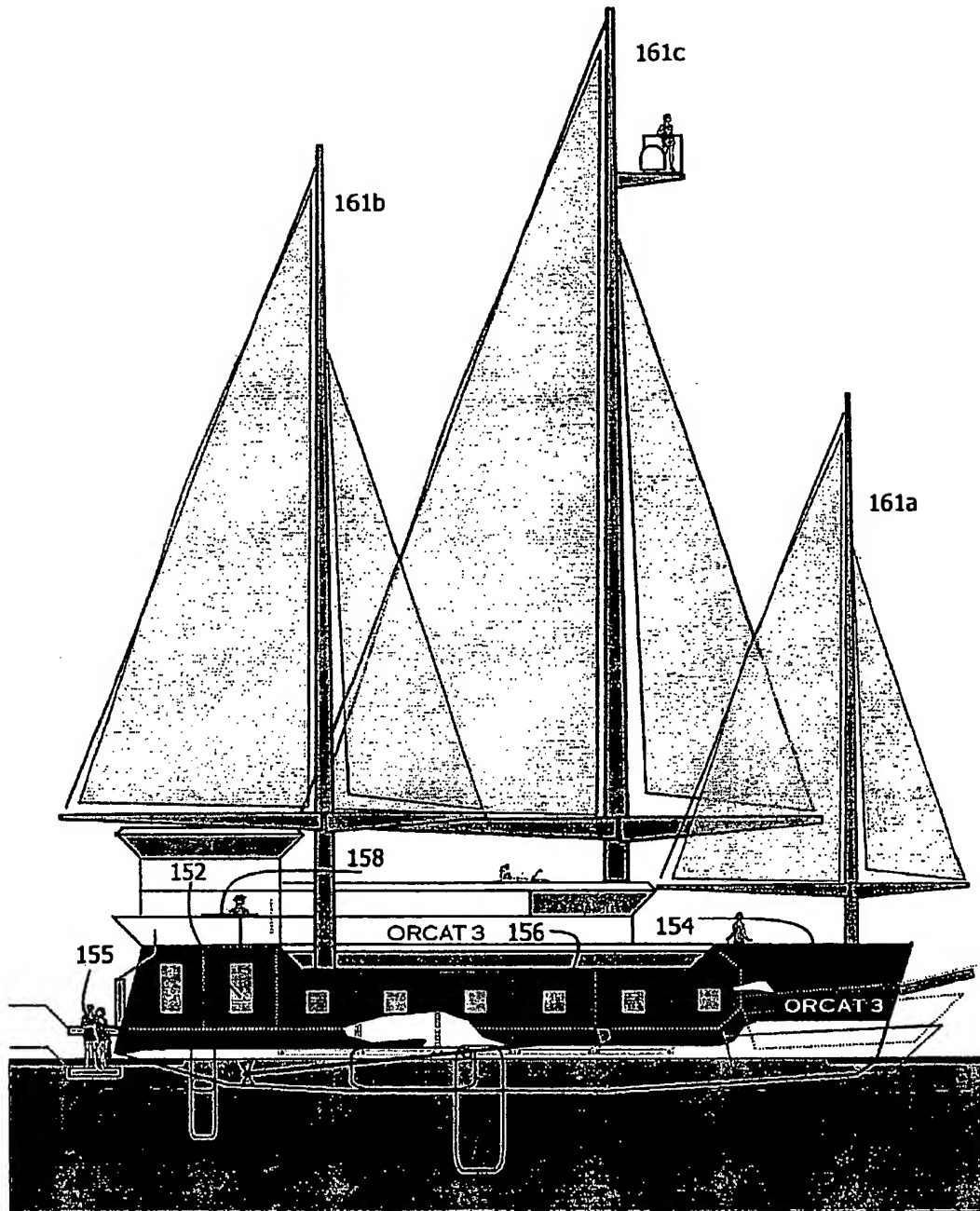


Fig. 71

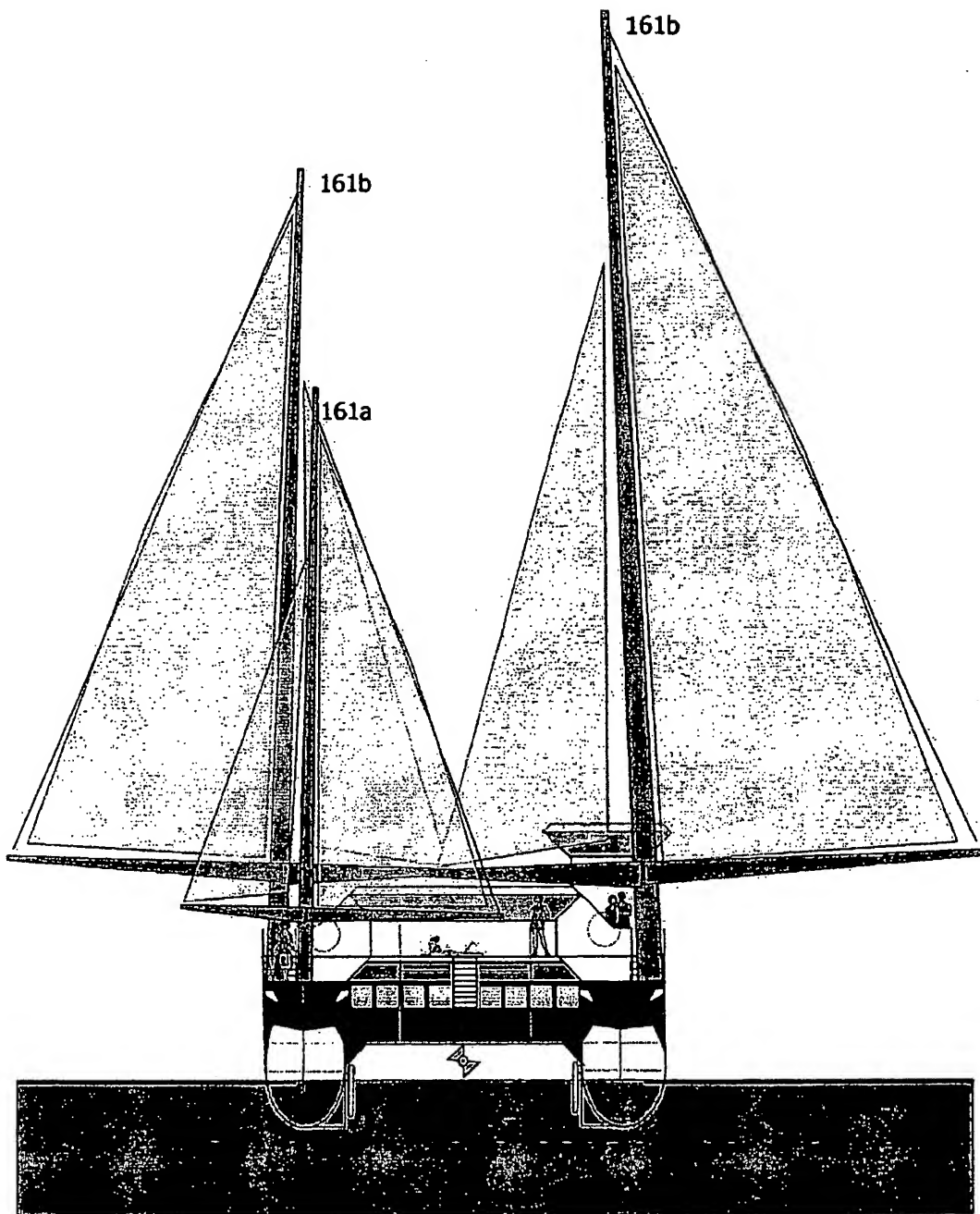


Fig. 72

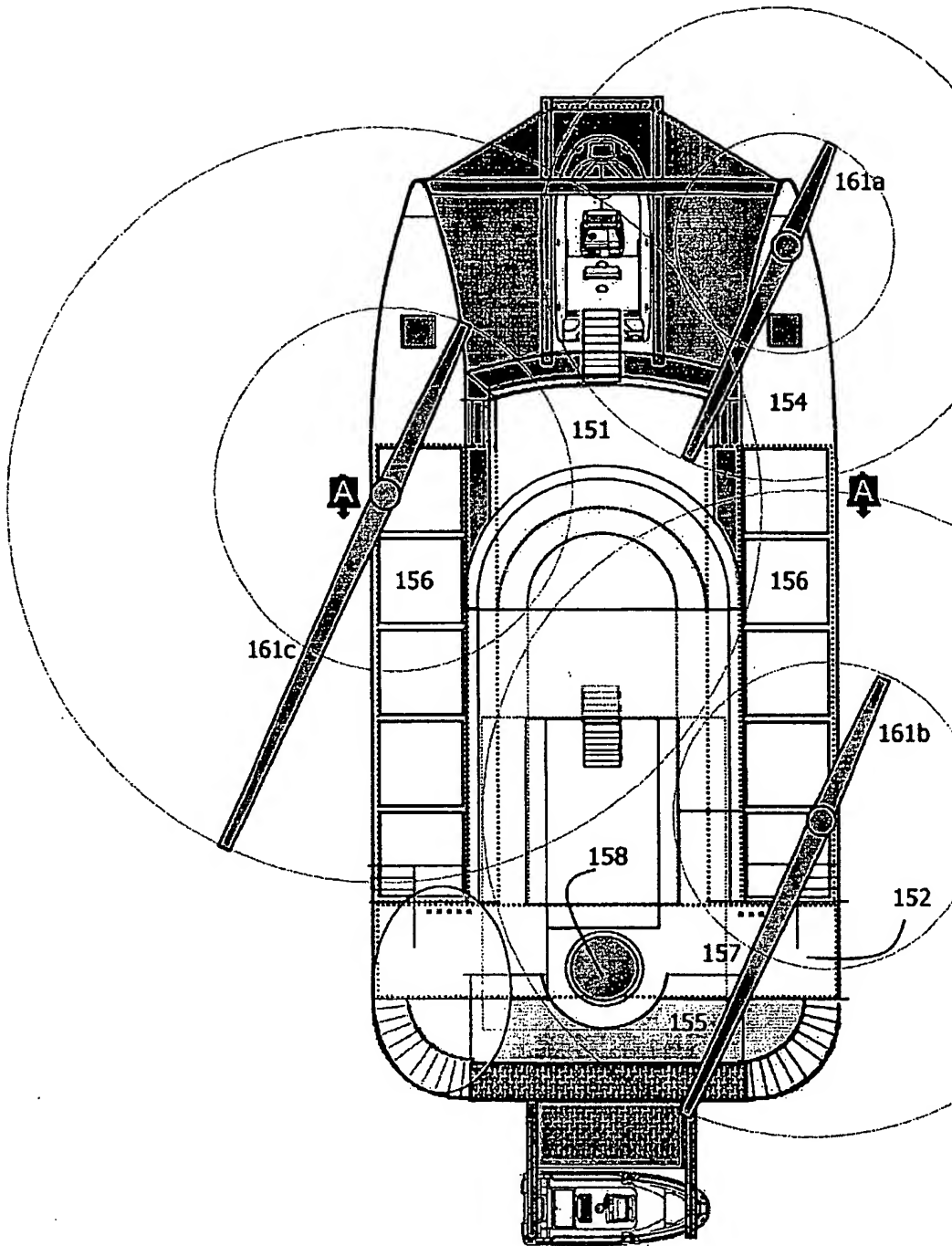


Fig. 73

10/508986

74 / 88

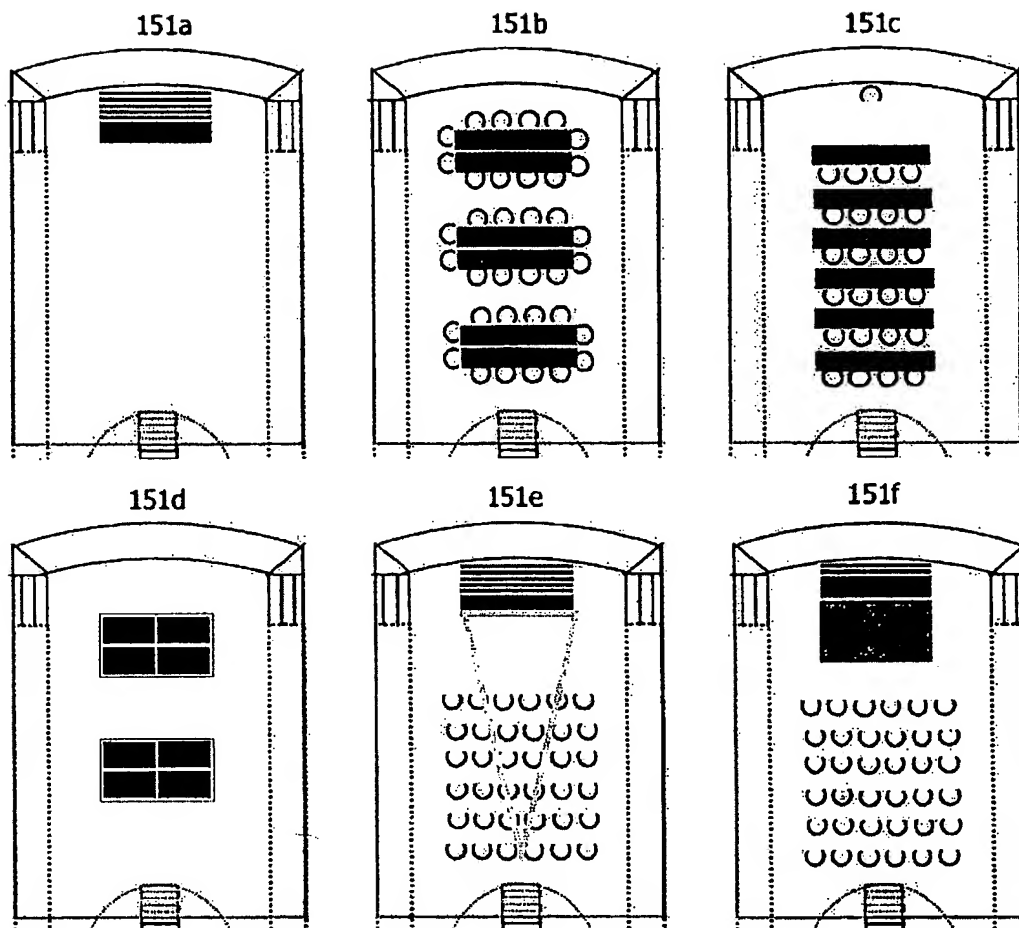


Fig. 74

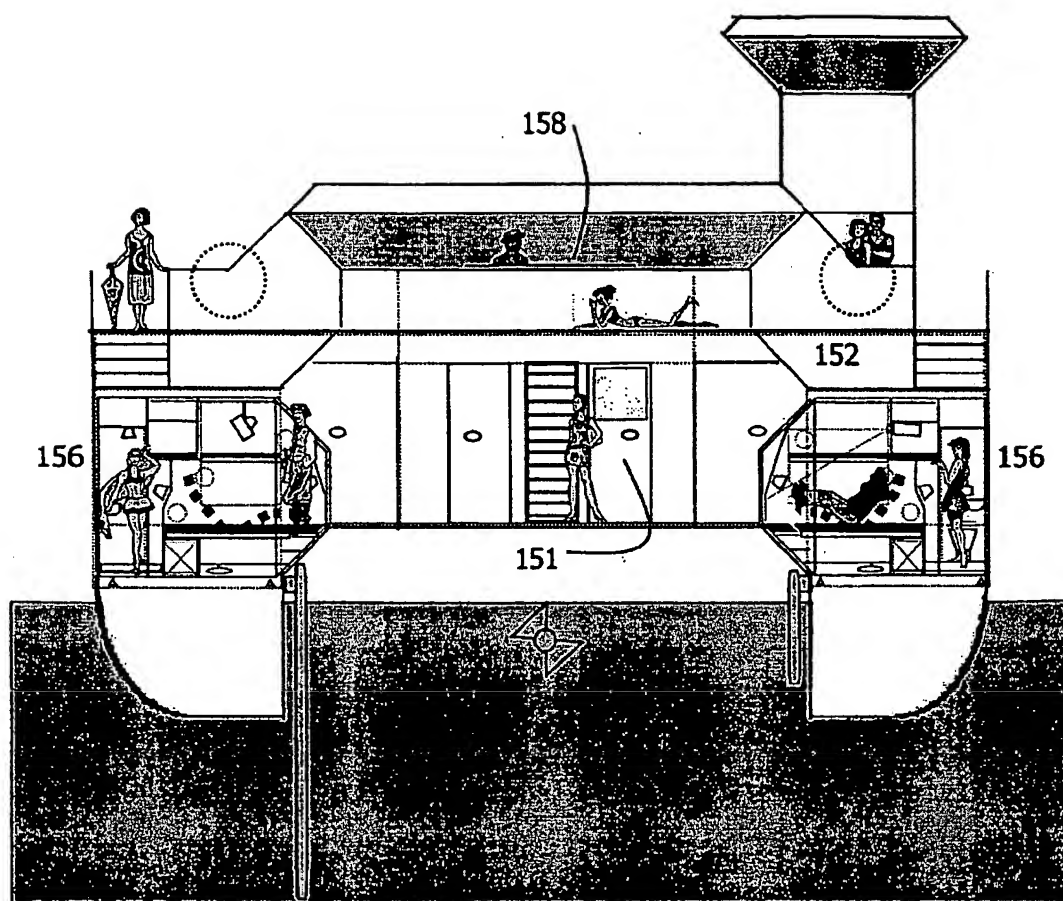


Fig. 75

10/508986

76 / 88

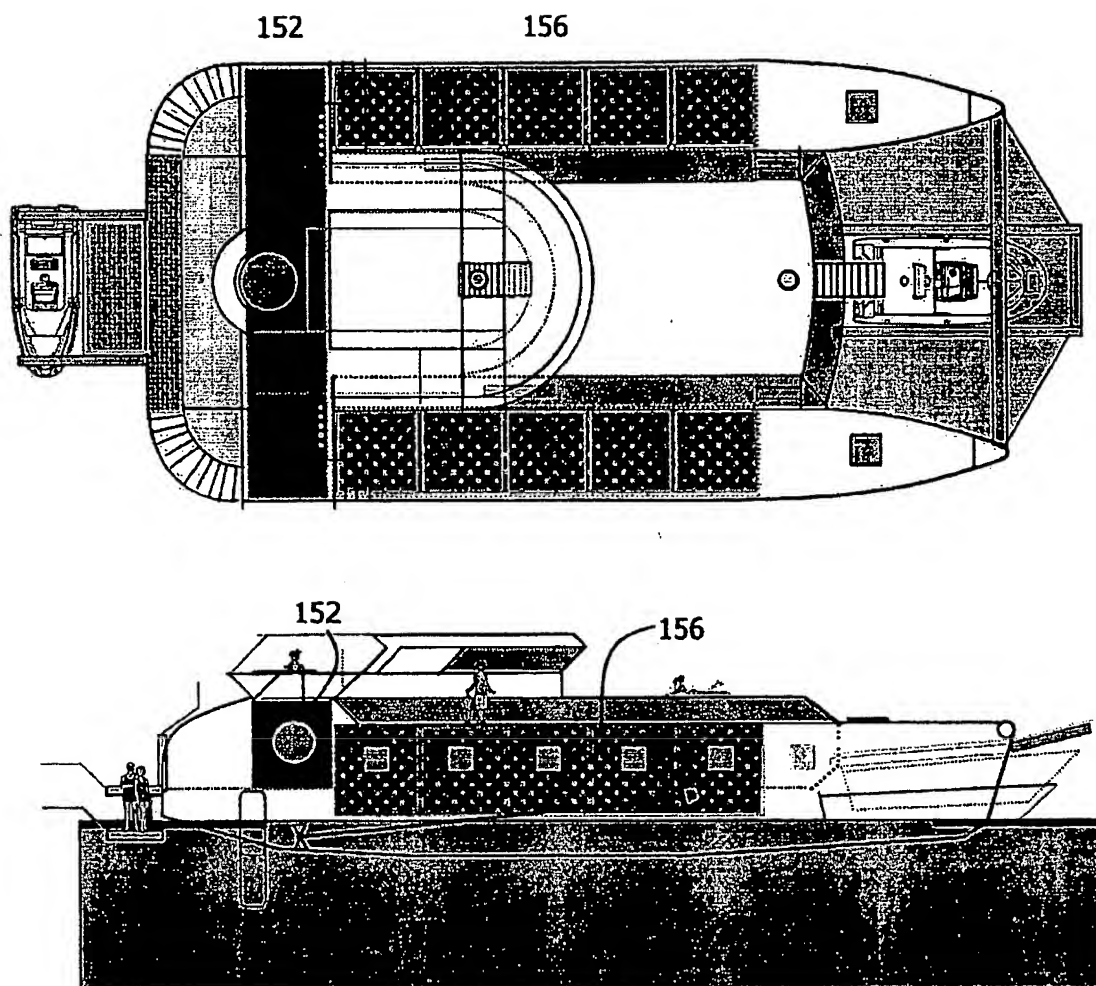


Fig. 76

10/508986

77 / 88

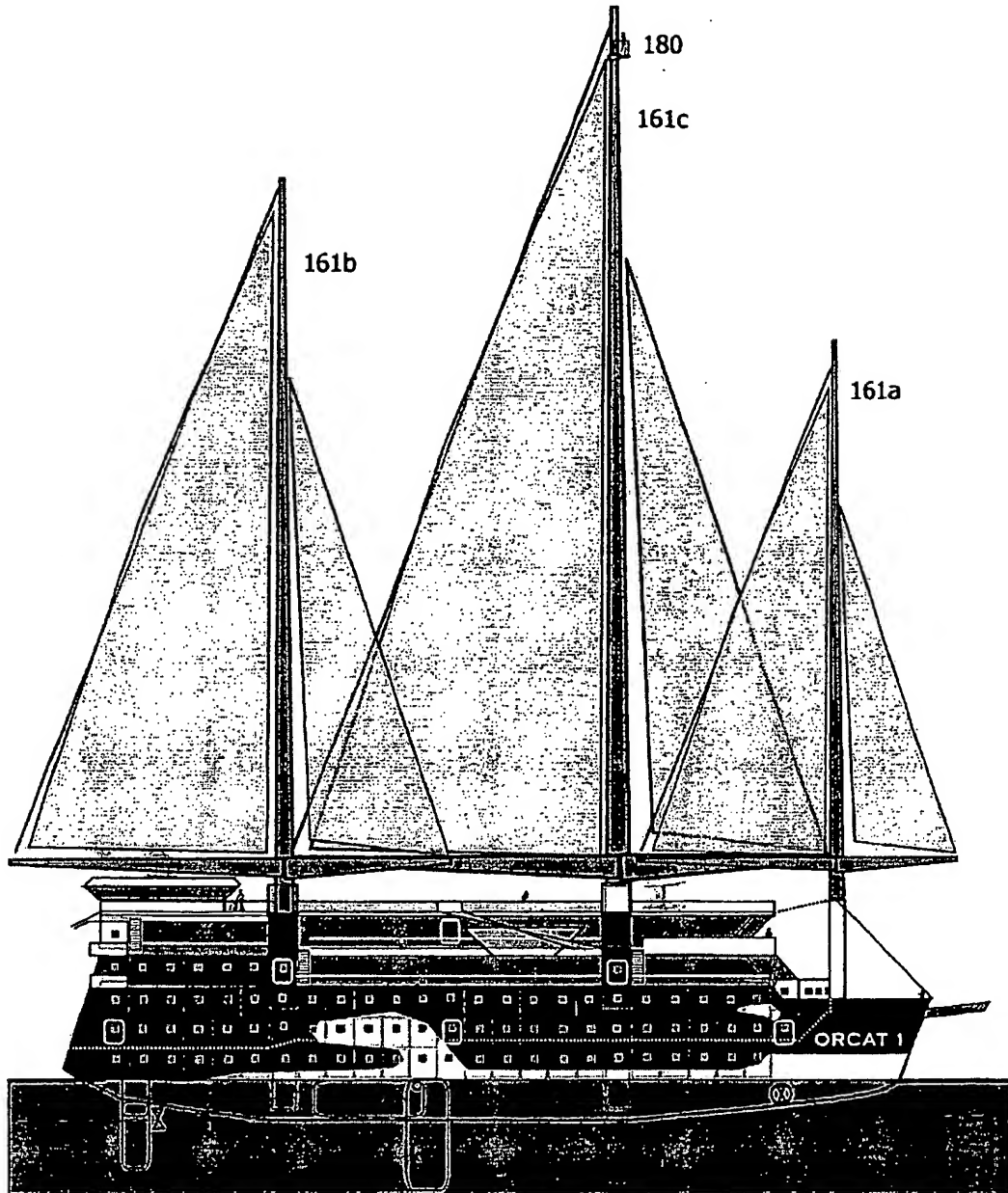


Fig. 77

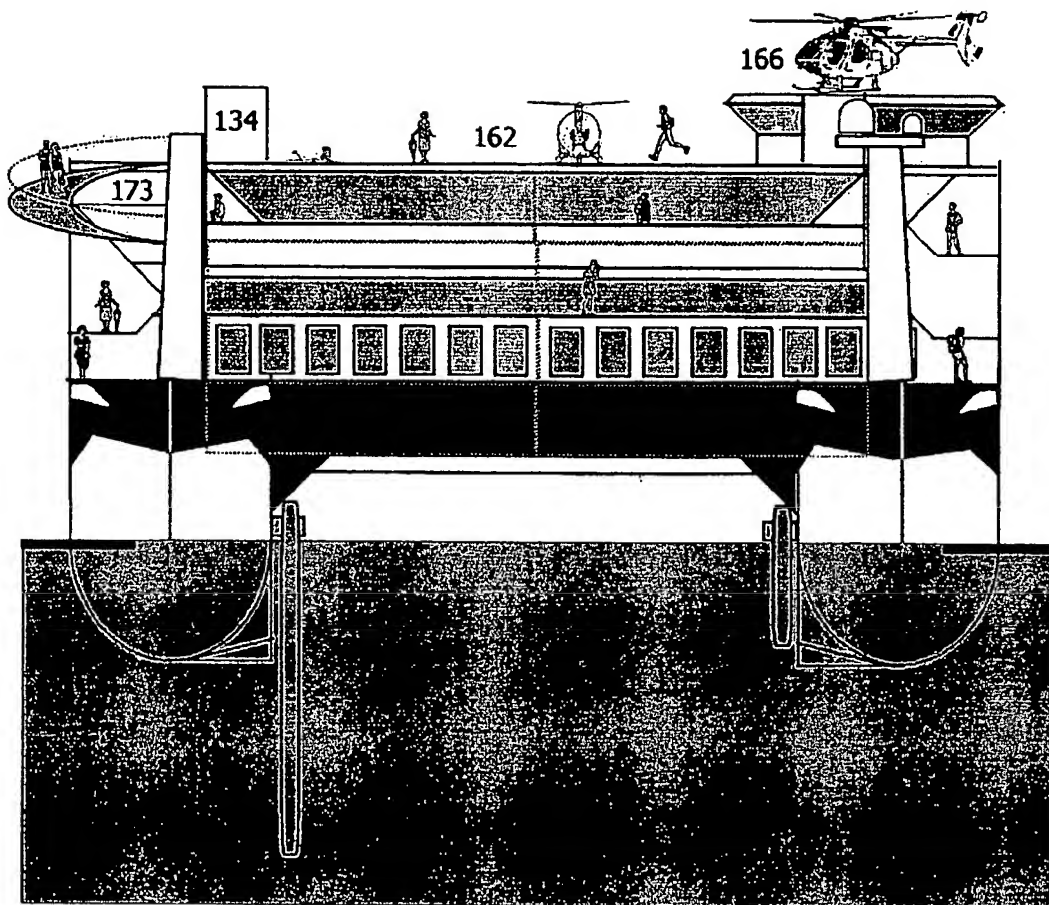


Fig.78

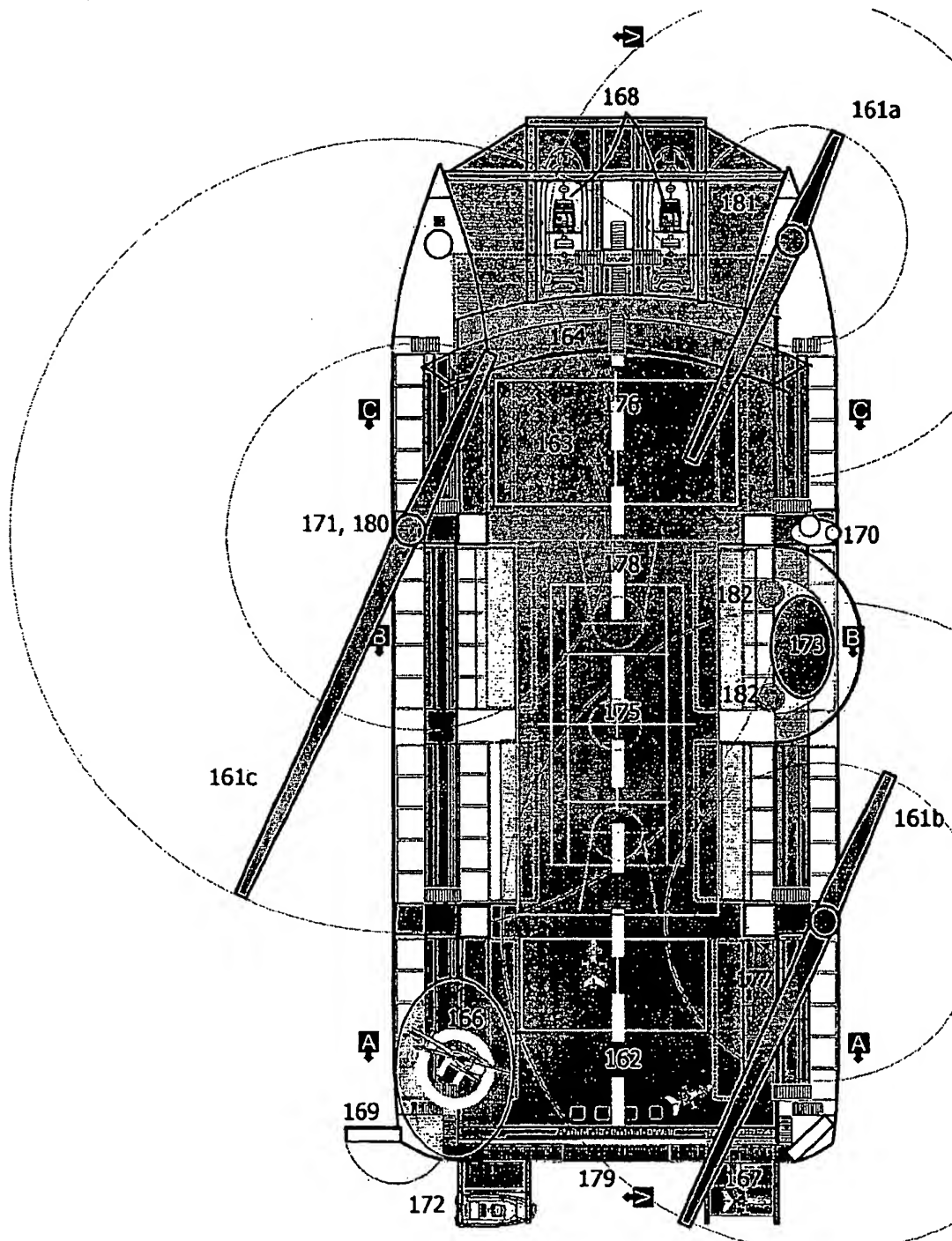


Fig. 79

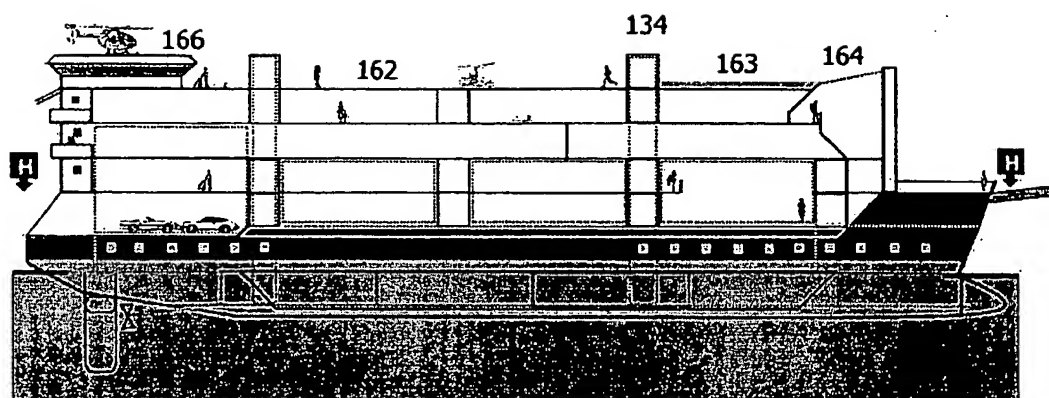


Fig. 80

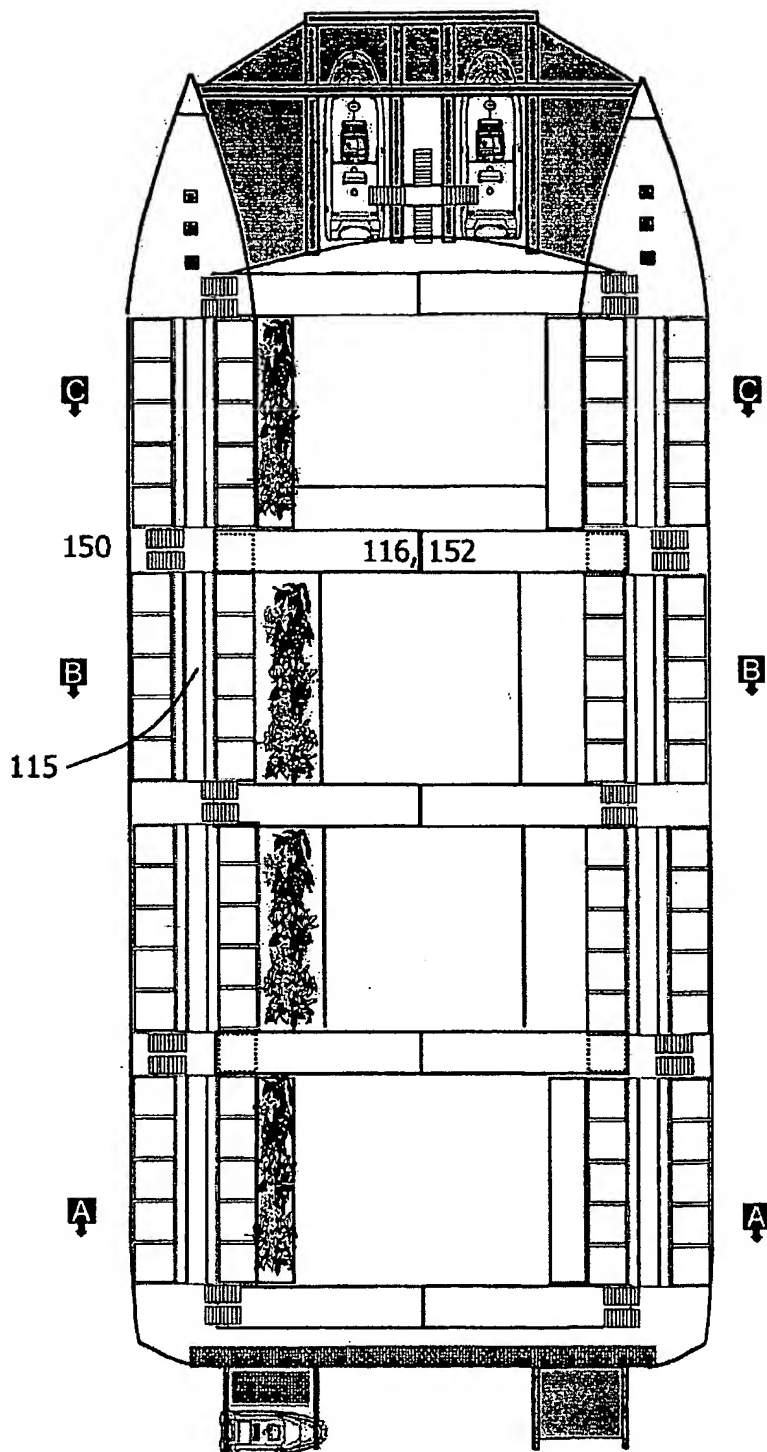


Fig. 81

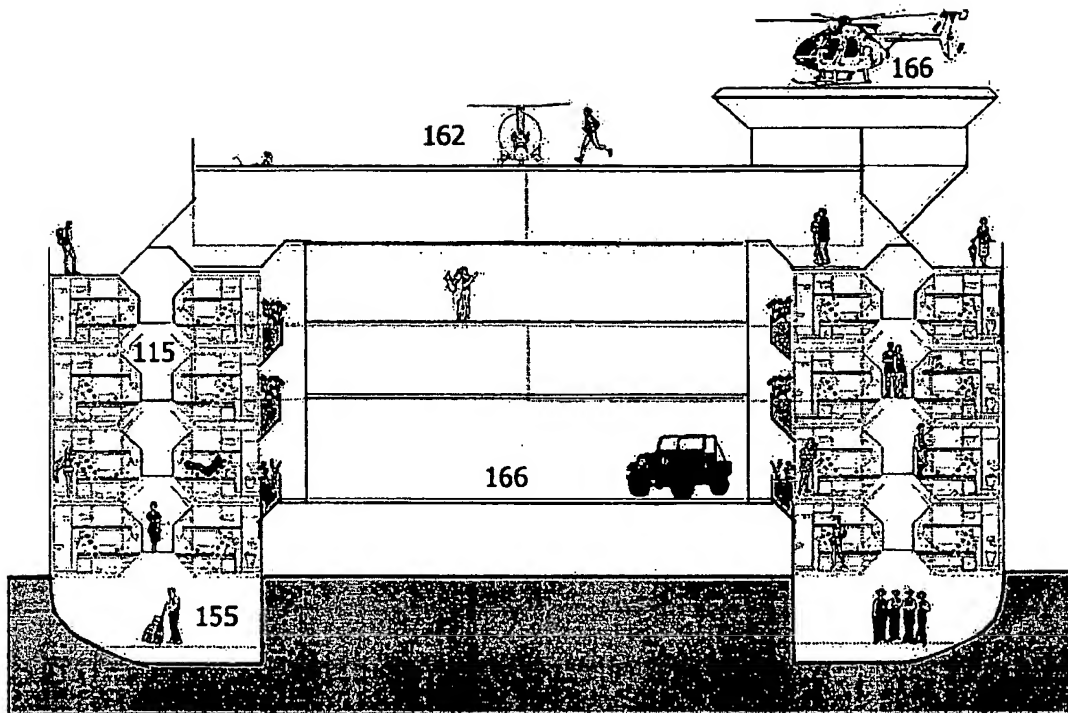


Fig. 82

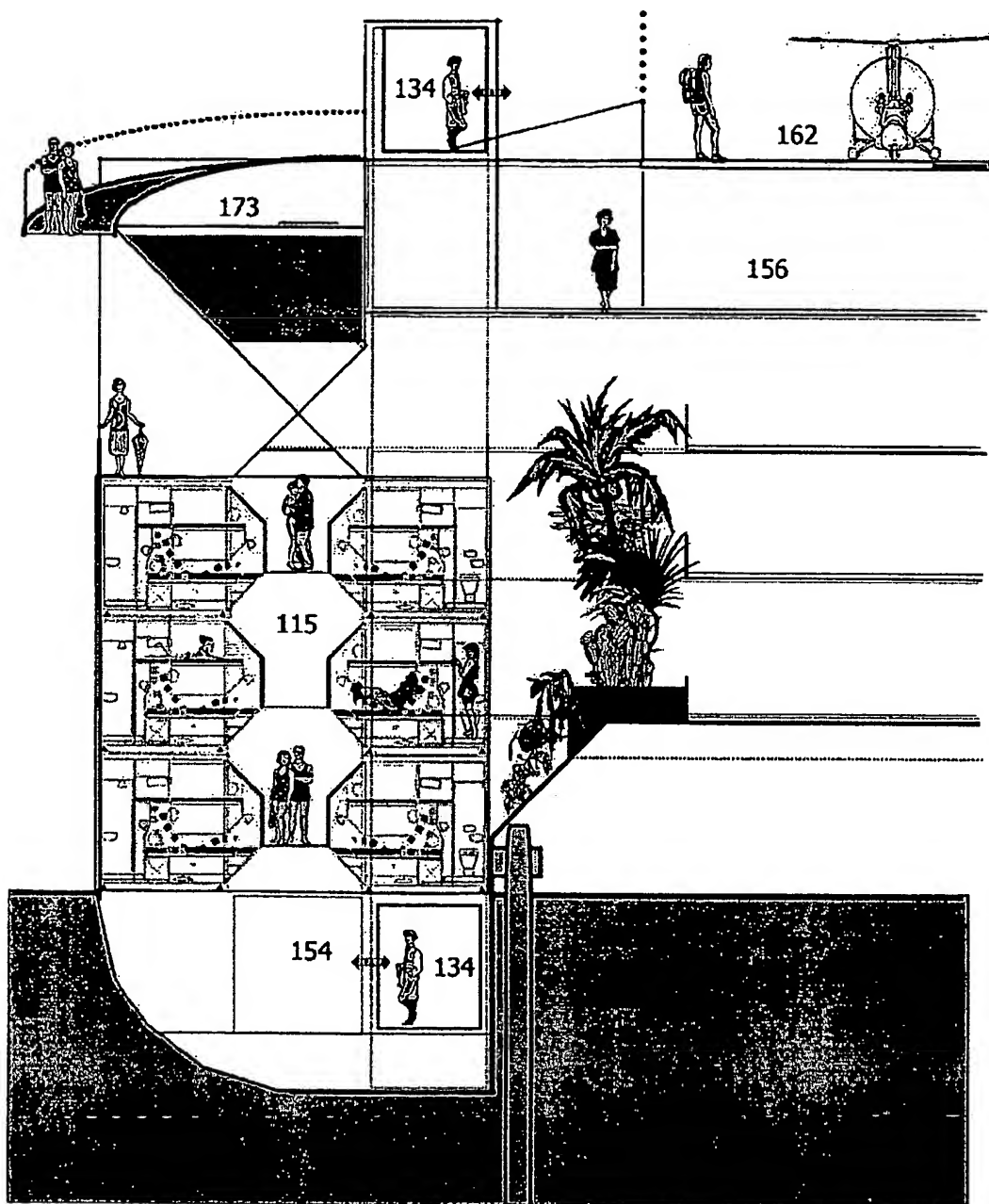


Fig. 83

10/508986

84 / 88

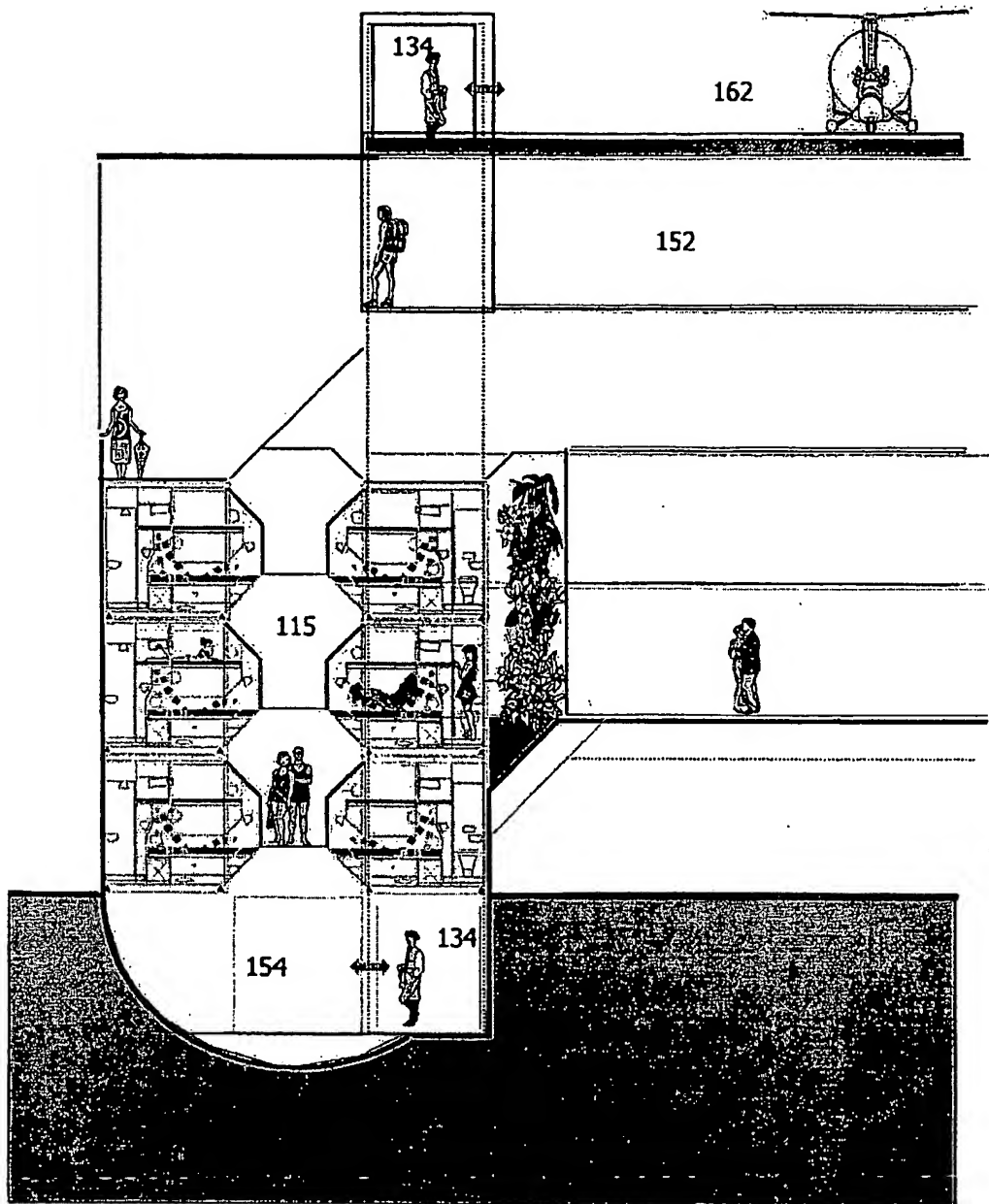


Fig. 84

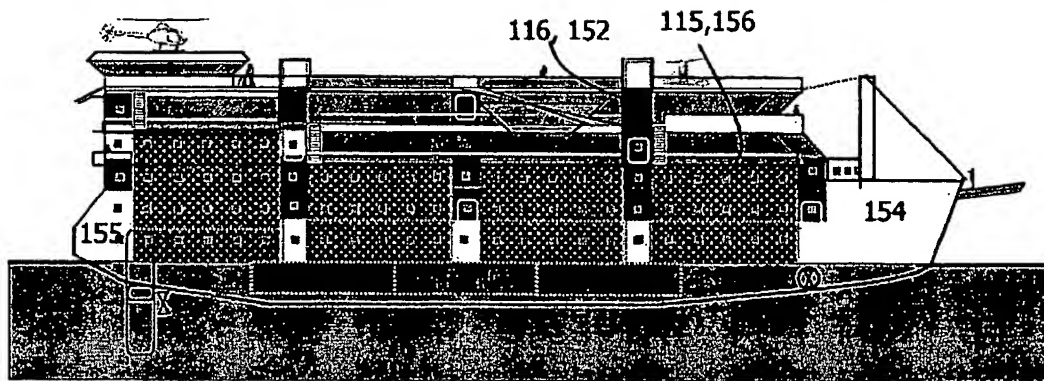


Fig. 85

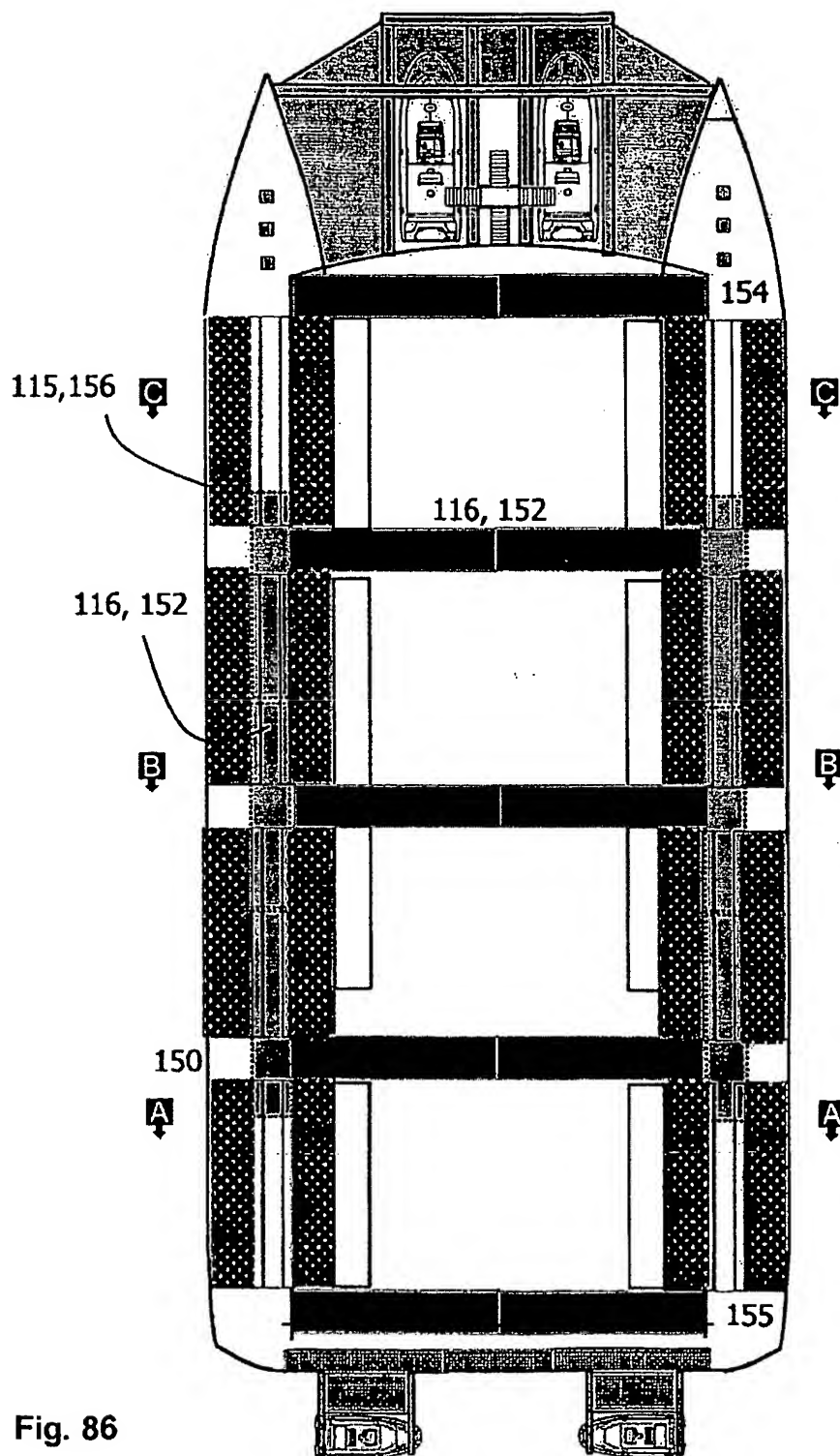


Fig. 86

87 / 88

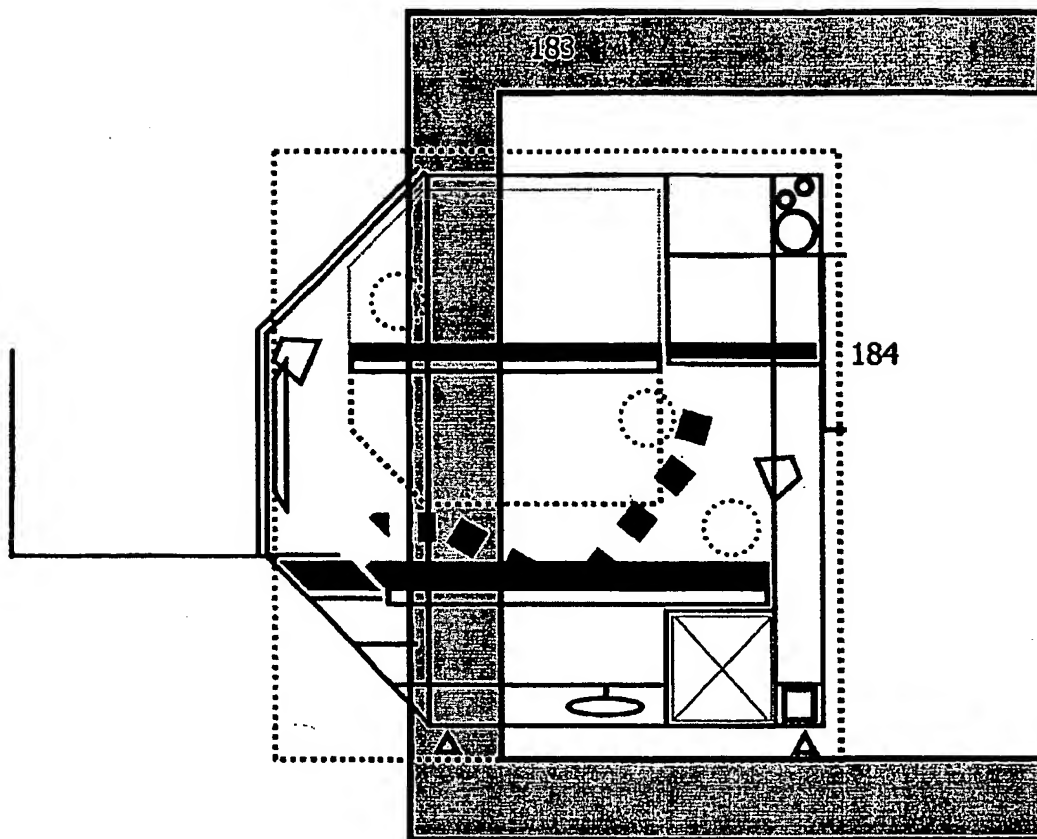


Fig. 87

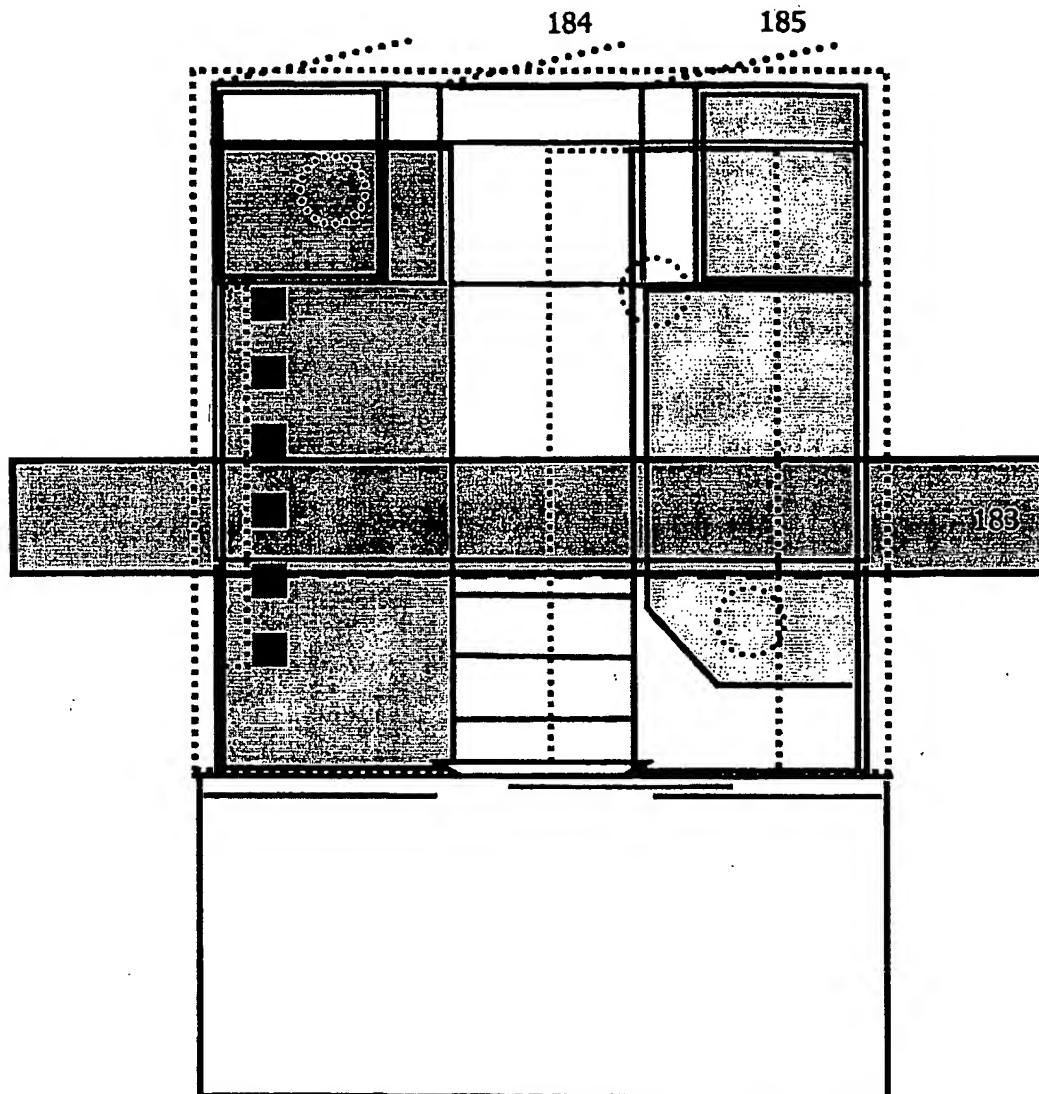


Fig. 88

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CH 03/00225

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04H3/02 E04B1/348 A47C17/16 B60P3/32 B63B29/02
A47C27/00 A47C27/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04H E04B A47C B60P B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 599 829 A (DIMARTINO SR JOHN M) 15 July 1986 (1986-07-15)	1,2
A	claims 1-9; figure 1	3
A	US 5 111 626 A (FORTUNE JEFFREY L) 12 May 1992 (1992-05-12) the whole document	1-3,7-13
A	DE 197 41 313 A (GAUCH RAINER) 29 April 1999 (1999-04-29) the whole document	1-5,7-9, 11
A	US 5 784 836 A (EHRICK STEPHEN D) 28 July 1998 (1998-07-28) the whole document	1,2,4,5, 7,8
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

2 July 2003

Date of mailing of the international search report

10/07/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040. Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Vrugt, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/CH 03/00225

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4599829	A	15-07-1986	NONE	
US 5111626	A	12-05-1992	AU WO	8954291 A 9207152 A1
				20-05-1992 30-04-1992
DE 19741313	A	29-04-1999	DE	19741313 A1
				29-04-1999
US 5784836	A	28-07-1998	AU WO	3970295 A 9614243 A1
				31-05-1996 17-05-1996
DE 4024497	A	06-02-1992	DE	4024497 A1
				06-02-1992

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.